

International Centre for NUMERICAL METHODS IN ENGINEERING

ANNUAL REPORT 2019

CIMNE^R



EXCELENCIA
SEVERO
OCHOA

Since 1987

GENERATING KNOWLEDGE AND SOLUTIONS

[ANNUALREPORT2019.CIMNE.COM](https://www.cimne.com/annual-report-2019)

2019 Annual Report

GENERATING KNOWLEDGE AND SOLUTIONS
Since 1987

CIMNE^R

CIMNE ANNUAL REPORT 2019

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About **CIMNE**



Eugenio Oñate (onate@cimne.upc.edu)
Executive Vicepresident and General Director of CIMNE

Director's Letter

The International Centre for Numerical Methods in Engineering (CIMNE) was created in April 1987. CIMNE's mission is the development and dissemination of original research in the field of Numerical Methods in Engineering (NME), the education of researchers and the transfer of the research outputs to industry.

CIMNE is a leader as an international centre of excellence in the field of NME through four main action vectors:

1. Excellence in research on NME for multidisciplinary engineering applications, in terms of scientific outputs and software-based tools.
2. International dimension.
3. Active participation and management in scientific societies.
4. Commitment to technology transfer to industry.

Research at CIMNE focuses on the development of NME of interest to the following scientific fields: structural mechanics, geomechanics, fluid dynamics, material sciences, optimization, biomechanics coupled multi-physics processes and high-performance computing. Applications include problems in civil, mechanical, aeronautics, naval/marine, biomedical and environmental engineering, energy efficiency and fusion technology, among others.

Since 1987 CIMNE has evolved to become a prestigious international research centre on NME. Its research staff (90% of whom are engineers) includes (by December 2019) 21 Full Research Professors, 11 Associate Research Professors, 17 Assistant Research Professors, 13 Postdocs, 6 Staff Scientists, 33 PhD Students, 59 Research Engineers, 7 Visiting Researchers and 39 Administration Staff from 27 countries.

Several researchers of CIMNE are faculty members of the Technical University of Catalonia (UPC) and develop their research duties in CIMNE. These distinguished affiliated researchers play an important role as

liaison between researchers at different groups of UPC and CIMNE.

RESEARCH PRIORITIES AND APPLICATIONS

The priorities of CIMNE for research excellence target new numerical methods (NM) and software codes to help engineers to better predict, design and optimize systems affecting our lives, including our environment, our security and safety, and the products we use and export. Indeed these goals can only be attempted from a multidisciplinary perspective.

Some relevant problems where the NMs developed at CIMNE are applied include: structural analysis of constructions and vehicles; safety of structures to natural hazards; geotechnical engineering and groundwater flow; oil and gas engineering; thermal-mechanical analysis of structures and mechanical systems; metal forming processes (sheet forming, casting, welding, additive manufacturing, machining, etc.); shape and material optimization; aerodynamics of aircrafts, sail boats and road vehicles; blast, crashworthiness and impact problems; ship hydrodynamics; analysis of coastal and offshore structures; flow of granular materials in the mining, construction, food and pharmaceutical industries and fusion technology, among other applications.

FOCUS OF CIMNE RESEARCH ON TERRITORY AND SUSTAINABILITY

Since December 2017 CIMNE is under the auspices of the Department of Territory and Sustainability (DTES) of the Catalanian Government. This has strengthened the research activities of CIMNE of interest to the civil and environmental engineering sector with a focus on applications to predictive territory management, smart infrastructures, water resources, energy efficiency, transport and mobility and environmental quality.

ORGANIZATION OF RESEARCH

Research in CIMNE is structured in research challenges (RChs) covering several challenging topics applicable to different engineering disciplines. See current CIMNE RChs at the “[Research](#)” section of this report.

Researchers at CIMNE carry out their activity within Research and Technical Development (RTD) Groups managed by a Group Leader. The research activities are coordinated by one or more Principal Investigators (PIs). RTD Groups are gathered in RTD Areas that target fields such as Civil and Environment Engineering, Computational Design and Analysis, Engineering Mechanics and Processes, Innovation Support and Tech Transfer, Innovative Algorithms and HPC Techniques and Transport. You can visit the CIMNE RTD Areas and Groups at www.cimne.com/research

INTERNATIONAL PRESENCE

CIMNE has established 2 legal international branches: CIMNE Latin America (Santa Fe, Argentina); and CIMNE USA (Washington DC, USA) and has also set up an international network of Joint Labs (the Aulas CIMNE) with 32 members: 6 in Spain and 26 in Latin America; aulas.cimne.com.

The International Association of the Aulas CIMNE (AIAC), created by CIMNE in 2015, aims to coordinate and foster the activities on the Aulas CIMNE network. More information of AIAC can be found on Alliances Section of this report.

RESEARCH OUTPUTS

Since 1987 CIMNE researchers have published some 2,700 JCR journal papers, 46 text-books, 86 edited books, 271 monographs, 417 RTD reports, 643 technical reports and organized 225 international scientific conferences. CIMNE has 6 patents.

CIMNE scientists are chief editors or associated editors of 6 international JCR journals and members of the editorial board of 15 JCR journals.

Since 1987 CIMNE researchers have taken part in 1,750 RTD projects, including 11 research projects funded by the European Research Council.

In 2019 CIMNE researchers have taken part in 81 RTD projects funded by international (34 projects) and national (47 projects) organizations which have meant

funding of 3,6 M€ for CIMNE. In the same period CIMNE had 139 RTD contracts with companies and private organizations amounting some 3,44 M€, managed 2 international MSc courses, 2 PhD programs and organized an average of 7 short courses and 13 seminars annually. Its research staff has supervised some 190 PhDs and some 756 MSc students.

Research at CIMNE has led to many software codes that are useful for solving specific problems in each of the engineering areas addressed. The “CIMNE Products” section of this report lists the main software codes developed at CIMNE.

CITATION RECORDS

By December 2019, CIMNE scientists had an h index of 120 and some 70,000 citations (Source: Google Scholar). Scopus records 553 JCR papers and 4,858 citations for the period 2015-19.

Several CIMNE researchers are ranked in the first positions of the ranking for Mathematics & Interdisciplinary Applications and others of engineering created by Group for the Dissemination of the h Index (further information cimne.com/research-rankings).

By December 2019 the Ranking Web of World Research Centres (research.webometrics.info) reports that 115 CIMNE researchers were among the 60,460 most cited scientists of Spain in terms of citations (webometrics.info/en/GoogleScholar/Spain).

MANAGEMENT OF SCIENTIFIC ORGANIZATIONS

CIMNE is the permanent Secretariat of the following scientific organizations:

- International Association for Computational Mechanics (iacm.info)
- European Community on Computational Methods in Applied Sciences (eccomas.org)
- Spanish Association for Numerical Methods in Engineering (semni.org)
- Pilot Centre of the European Research Community in Flow, Turbulence and Combustion (ercoftac.org)
- Unesco Chair on Numerical Methods in Engineering of UPC (cimne.com/unesco). This is the first UNESCO Chair in the world, created in 1989.

TECHNOLOGY TRANSFER

CIMNE has a vocation for technology transfer. Since 2001 it has launched 20 spin-off companies. These companies market a number of products emanating from CIMNE research. Details of the companies are given in Section 3.2 and on cimne.com/spin-offs and www.cimnetecnologia.com.

AWARDS TO CIMNE AND ITS SCIENTISTS

Since 1987 CIMNE and its scientists have received some 70 awards by national and international organizations. The total list of CIMNE Awards, and those granted in 2019, can be seen on page 96 and on cimne.com/awards.

ORGANIZATION OF SCIENTIFIC CONFERENCES

The organization of international scientific conferences and workshops is a relevant activity of CIMNE research policy. The CIMNE Conference Bureau Dpt. acts as a professional organizer of international events of scientific and technical interest to CIMNE.

Since 1987 CIMNE has organized some 200 international events. In 2019 CIMNE organized 8 international conferences on different topics related to NME. Some 16 events are already planned for the period 2020-21. Details of future and past events can be found in Section 5.2 of this report and in congress.cimne.com.

RTD ALLIANCES

CIMNE is a founding partner of the FLUMEN Institute in River Dynamics and Hydraulic Engineering (www.flumen.upc.edu).

In July 2017 CENIT (Centre for Innovation in Transport, cenit.es) merged its current structure into that of CIMNE, thus broadening the scope of the research activities of CIMNE in the field of transport engineering.

CIMNE has established research alliances with numerous prestigious institutions around the world.

A compilation of the most outstanding collaborations can be found in the “Alliances” section of this report.

DISSEMINATION AND COMMUNICATION STRATEGY

Dissemination and communication tasks at CIMNE involve various activities to bring the research outcomes to the attention of as many people as possible. Fre-

quent use of social media tools are used for this purpose (Facebook, Twitter, etc). The Publications Dpt. (cimne.com/publications) of CIMNE publishes research and technical reports, monographs, text and edited books and software codes. The Aulas CIMNE network is also used for dissemination actions.

SCIPEDIA: CIMNE STRATEGY TOWARDS THE HOLISTIC 4.0 OPEN-ACCESS SCIENCE

In March 2016 CIMNE, via its spin-off company Scipedia SL, launched the innovative web platform Scipedia.com with the aim of providing free publishing and Open Access services to disseminate the results of scientific and technical work.

CIMNE SELECTED AS A CENTRE OF EXCELLENCE SEVERO OCHOA

In December 2019 CIMNE was selected as one of the “Centres for Excellence Severo Ochoa” accredited by the Spanish State Research Agency, attached to the Spanish Ministry of Science, Innovation and Universities. The Severo Ochoa Centers are selected on the basis of their excellence on scientific research and technical development activities. This important distinction includes governmental funding to hire some 35 new PhDs and 15 Postdocs for the period 2020-2023. For details see: cimne.com/severo-ochoa and cimne.com/KOM-severo-ochoa

A SELF-SUSTAINED ORGANIZATION

CIMNE has implemented an (almost) self-sustainable financial model with limited annual public funding.

This has been possible by combining public seed funding (mainly from the Government of Catalonia) with income from RTD projects sponsored by public and private organizations, dissemination activities, revenues from its spin-off companies and an efficient management structure. Since 1987, CIMNE’s self-obtained annual income has amounted (in average) to 95% of its total annual budget. Details of the structure of CIMNE funding in 2019 and in recent years can be found on page 10.

I thank CIMNE staff and its many partners and friends in universities, research centres and industry worldwide for their cooperation that contributes to making of CIMNE a centre of reference in its field.

Eugenio Oñate

Vicepresident and General Director of CIMNE

CIMNE in Numbers

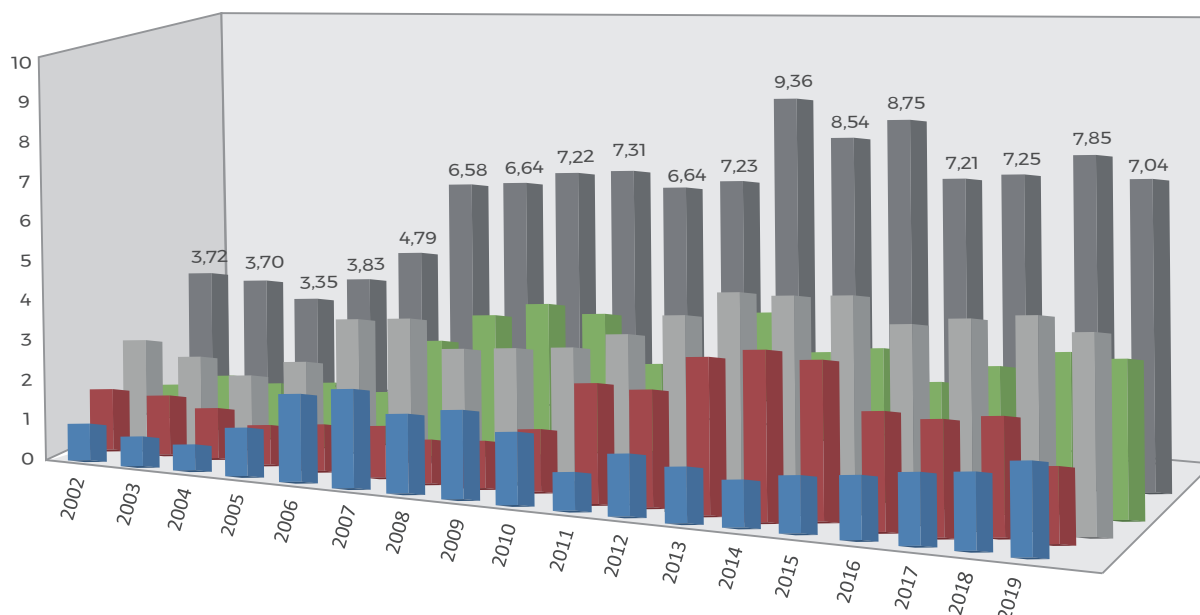
ACTIVITIES	2019
Postgraduate Studies	4
Conferences	8
Seminars	13
Courses	7
Coffee Talks	15
Publications	121
Books	2
Monographs	5
Research Reports	0
Papers in Journals	114
Spin-off Companies	16
Aulas CIMNE	32
Patents	0 (5)
Contracts with Industry	73 (139)
Competitive Projects	26 (81)
National Projects	15 (47)
EU and international Projects	11 (34)

In brackets, the total number of on-going contracts and RTD projects.

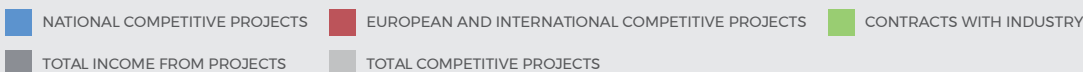
STAFF / POSITION TITLE	2019
Management Staff	2
Administration Staff	39
Research Staff	68
Full Research Professors	21
Associate Research Professors	11
Assistant Research Professors	17
Staff Scientists	6
Post Docs	13
Research Engineers	59
Research Students	41
PhD Students	33
Master Students	5
Undergraduate Students	3
TOTAL Staff	209

Income from projects (2002-2019)

in M€

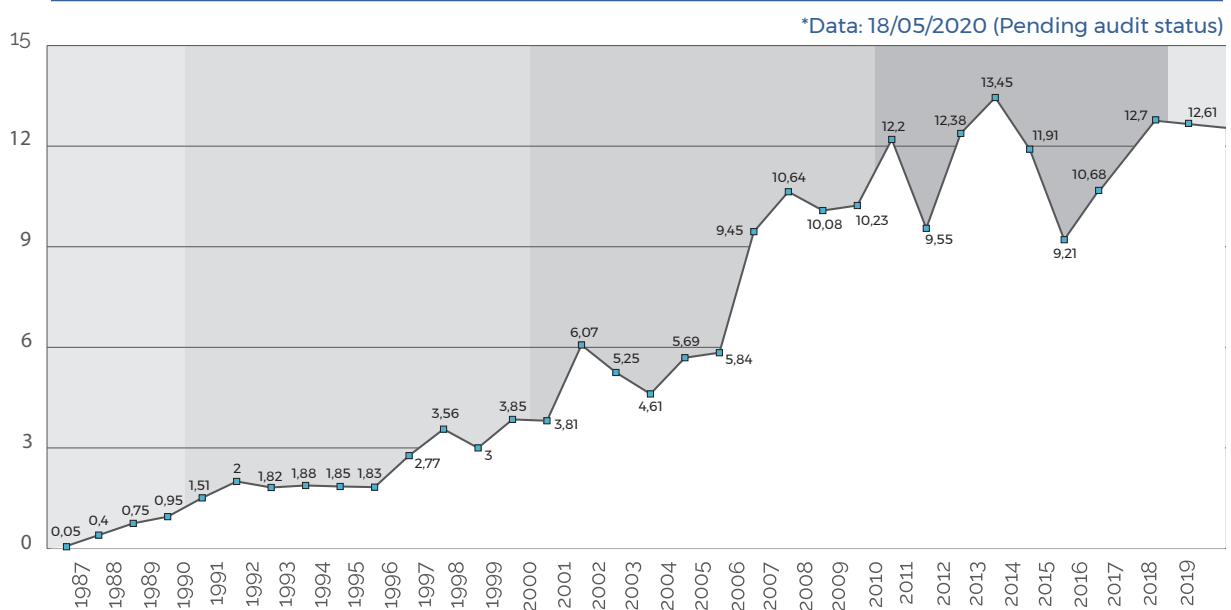


*Data: 18/05/2020 (Pending audit status)



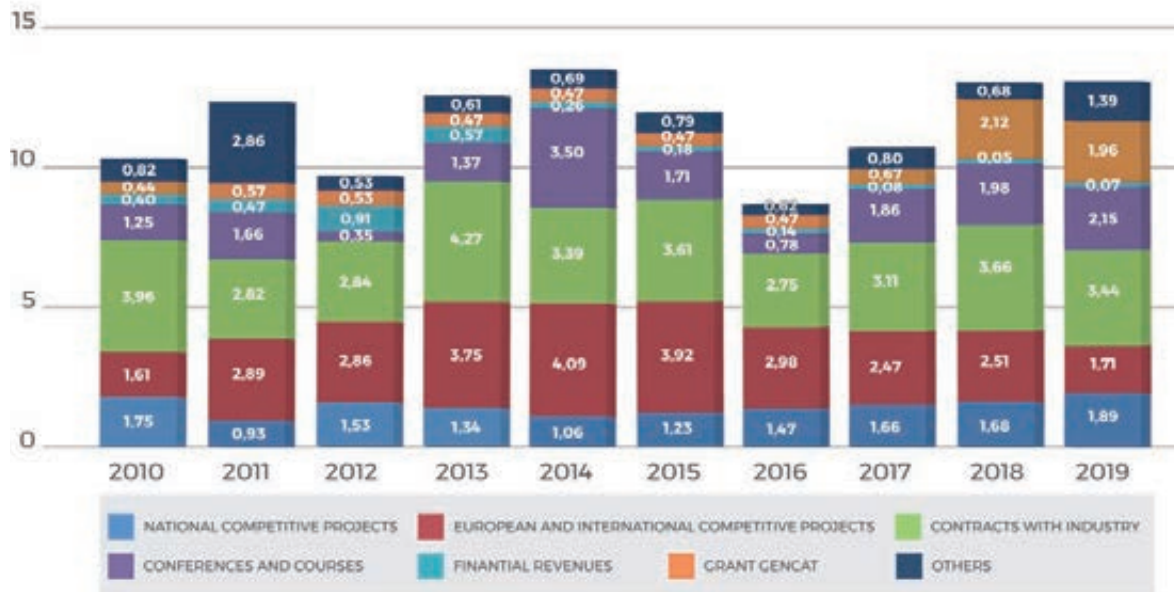
Evolution of Annual income (1987-2019)

in M€



Split of Annual income (2010-2019)

in M€



*Data: 18/05/2020 (Pending audit status)

Governing Bodies

Governing council

President

Hon. Mr. Damià Calvet

Minister of Territory and Sustainability
(Government of Catalonia)

Representing Catalan Government

Ms. María Matilde Villarroya

Director-General for Industry
(Government of Catalonia)

Mr. Isidre Gavín

Secretary for Infrastructure and Mobility
(Government of Catalonia)

Dr. Joan Gómez Pallarès

Director-General for Research
(Government of Catalonia)

Vice-President

Dr. Eugenio Oñate

Full Professor (UPC · BarcelonaTech)

Representing UPC · BarcelonaTech

Dr. Francesc Torres

Rector (UPC · BarcelonaTech)

Dr. Luca Pelà

Vice-rector for Scientific Policy (UPC · BarcelonaTech)

Dr. Pedro Díez

Full Professor (UPC · BarcelonaTech)

Representing UNESCO

Dr. Lluís Ramallo

President of the Spanish Commission of UNESCO

Executive council

President

Dr. Eugenio Oñate

Full Professor (UPC · BarcelonaTech)

Members

Mr. Xavier Baulies

Department of Territory and Sustainability
Government of Catalonia

Dr. Jordi Berenguer

UPC · BarcelonaTech

Dr. Esteve Codina

UPC · BarcelonaTech

Dr. Cecilia Soriano

UNESCO

Dr. Gabriel Bugeda

Catedràtic (UPC · BarcelonaTech)

Dr. Antonio Gens

UPC · BarcelonaTech

Dr. Alejandro Josa

UPC · BarcelonaTech

Dr. Juan Miquel

UPC · BarcelonaTech

Dr. Juan Jesús Pérez

UPC · BarcelonaTech

Dr. Estanislau Roca

UPC · BarcelonaTech

Dr. Lluís Rovira

Institució Centres de Recerca de Catalunya

Ms. Ana Simon

ACCIÓ, Generalitat de Catalunya



Scientific Advisory Council (Meeting SAC on November 8th, 2017)

From left to right - Sitting down: Dr.-Ing. D. Knörzer (former EC Officer in Aeronautics), Prof. D.R.J. Owen (†) (Swansea Univ., UK), Prof. J. Bonet (Univ. of Greenwich) and Prof. C. von Voigt (Leibniz Univ., Germany). Standing up: Prof. E. Oñate (CIMNE, Spain), Prof. M. Turró (Technical Univ. of Catalonia, Spain), Prof. B. Schrefler (Univ. of Padova, Italy), Prof. M. Kleiber (Polish Academy of Sciences, Poland), Prof. H. A. Mang (Technische Universität Wien, Austria), Prof. Ekkehard Ramm (Univ. of Stuttgart, Germany), Prof. M. Papadarakakis (National Technical Univ. of Athens, Greece), Prof. M. Casteleiro (Univ. of La Coruña, Spain).

Scientific Advisory Council

Chairman

Dr. Roger Owen (†)

Swansea University, UK

Prof. Bernd Kröplin (†)

University of Stuttgart, Germany

Prof. Ekkehard Ramm

University of Stuttgart, Germany

Members

Prof. Javier Bonet

University of Greenwich, UK

Prof. Rainald Löhner

George Mason University, USA

Prof. Bernhard Schrefler

University of Padova, Italy

Prof. Manuel Casteleiro

Universidade da Coruña, Spain

Prof. Herbert A. Mang

Technische Universität Wien,
Austria

Prof. Mateu Turró

Technical University of
Catalonia, Spain

Prof. Michael Kleiber

Polish Academy of Sciences,
Poland

Prof. Xavier Oliver

Technical University of
Catalonia, Spain

Prof. Gabriele von Voigt

Leibniz University, Germany

Dr.-Ing. Dietrich Knörzer

Former EC Officer

Prof. Manolis Papadarakakis

National Technical University of
Athens, Greece

Prof. Peter Wriggers

Leibniz University, Germany

(†) Professor David Roger Jones Owen, Roger for his friends, died in Swansea at the age of 77 on Monday, January 13th. He was Emeritus Professor in the Civil and Computational Engineering Centre at Swansea University, Wales, UK, and an international authority on finite element and discrete element techniques.

Prof. Owen was one of the few extraordinary cases in which the same person gathers all the attributes of being an eminent scientist and academic, and by having contributed with their work to the development of society.

As a scientist, he made important contributions to the field of computational mechanics. He was also a fine academic, an excellent teacher and a mentor of some 70 Ph.D. students. Last but not least, his work has been seminal to the development of computational mechanics worldwide.

His entrepreneurship side was evidenced by his personal involvement in creating and developing the company Rockfield Software Limited, twice acknowledged by the British Queen for being an innovative and successful international enterprise.

He received numerous awards from international organizations. For instance, he was a Fellow of the Royal Society (UK), a member of the Royal Academy of Engineering (UK) and the US National Academy of Engineering.

He also received the Gauss Newton Medal of the International Association for Computational Mechanics (IACM), the Grand Prize of the Japan Society for Computational Engineering and Science (JSCES) and the Award of the Spanish Association for Numerical Methods in Engineering (SEMNI).

Organization Chart

GOVERNING COUNCIL

Chair: Damià Calvet

EXECUTIVE COUNCIL

Chair: Eugenio Oñate

SCIENTIFIC ADVISORY COUNCIL

Chair: Roger Owen (†)

GENERAL DIRECTOR

Eugenio Oñate

SCIENTIFIC DIRECTOR

Pedro Díez

PROJECT DEVELOPMENT DIRECTOR

Fernando Salazar

INSTITUTIONAL RELATIONS DIRECTOR

Gabriel Bugada

MANAGING DIRECTOR

Anna Font

Research and Tech Development (RTD Areas & Groups)

CIVIL AND ENVIRONMENTAL ENGINEERING

Building, Energy and Environment

Leader - Jordi Cipriano

Disaster Risk and Resilience

Leader - Liliana Carreño

Geomechanics

Leader - Antonio Gens

Hydrogeology

Leader - Xavier Sánchez Vila

Machine Learning in Civil Engineering

Leader - Fernando Salazar

River Dynamics and Hydrologic Engineering (FLUMEN Institute)

Leader - Ernest Bladé

Structural Mechanics

Leader - Eugenio Oñate

COMPUTATIONAL MATERIALS DESIGN & ANALYSIS

Computational Design & Analysis of Engineering Metamaterials

Leader - Xavier Oliver

Mechanics of Electroactive Materials

Leader - Irene Arias

Soft and Living Material Interfaces

Leader - Marino Arroyo

ENGINEERING MECHANICS AND PROCESSES

Bio-Medical Engineering

Leader - Eduardo Soudah

Fluid Mechanics

Leader - Ramon Codina

Industrial Manufacturing Processes

Leaders - Michele Chiumenti and Miguel Cervera

INNOVATIVE ALGORITHMS AND HPC TECHNIQUES

Credible Data-driven Models

Leader - Pedro Díez

Kratos Multiphysics

Leader - Riccardo Rossi

Innovative Algorithms for Fast Accurate Computing

Leader - Antonio Huerta

Large Scale Scientific Computing

Leader - Santiago Badia

TRANSPORT AREA

Aeronautics

Leader - Jordi Pons

CENIT Group for Innovation in Multimodal Transport

Leader - Sergi Saurí

Naval and Marine Engineering

Leader - Julio García

Administration

ACCOUNTANCY AND FINANCES

Leader - M^a Carmen Linares

COMMUNICATION

Leader - Laura Bermúdez

CONGRESS BUREAU

Leader - Cristina Vizcaya

HUMAN RESOURCES

Leader - Irene Latorre

POST-GRADUATE TRAINING

Leader - Lelia Zielonka

PROJECT MANAGEMENT

Leader - Sandra Pérez

PUBLICATIONS

Leader - M^aJesús Samper

SYSTEMS

Leader - Miguel Alonso

INNOVATION SUPPORT AND TECHNOLOGY TRANSFER

Information and Communication Technology

Leader - Jordi Jiménez

Pre and Post Processing

Leader - Abel Coll

Valorization of Research and Technology Transfer

Leader - Javier Marcipar

CIMNE Staff

This is the list of all persons who collaborate with CIMNE at December 31st 2019

Research and Technology Development

FULL RESEARCH PROFESSORS

Carmen Andrade
Marcos Arroyo
Carlos Agelet de
Saracibar
Eduardo Alonso
Irene Arias
Marino Arroyo
Santiago Badia
Álex H. Barbat
Gabriel Bugeda
José Antonio Canas
Juan Ramón Casas
Miguel Cervera
Michele Chiumenti
Ramón Codina
Pedro Díez
Julio García
Antonio Gens
Antonio Huerta
Sergio Idelsohn
Antonio Lloret
Juan Miquel
José Javier Muñoz
Xavier Oliver
Sebastián Olivella
Sergio Oller
Eugenio Oñate
Javier Príncipe
Enrique Romero
Riccardo Rossi
Xavier Sánchez
Jean Vaunat
Roland Wüchner

ASSOCIATE RESEARCH PROFESSORS

Juan Carlos Cante
Josep M. Carbonell
Liliana Carreño
Daniel Di Capua
Roberto M. Flores
Oriol Lloberas
Jaime E. Martí
Xavier Martínez
Núria Pinyol
Pavel Ryzhakov
Francisco Zárate

ASSISTANT RESEARCH PROFESSORS

Pedro Arnau
Joan Baiges
Ernest Bladé
Jordi Cipriano
Narges Dialami
Alessandro Franci
José M. González
Jerrad David Hampton
Joaquín A. Hernández
Alberto Ledesma
Julio M. Martí
Enrique Ortega
Jordi Pons
Marcelo Raschi
Borja Serván
Eduardo Soudah

POST DOCS

Lucía Barbu
Jordi Cotella
Ignasi de Pouplana
Eloi Gabaldón
Daniel A. García
Laura González
Joaquín Irazábal
Bàrbara Llacay
Anna Ramón
Roger Ruiz
Javier San Mauro
Erdem Toprak
Francesc Verdugo
David J. Vicente

STAFF SCIENTISTS

Abel Coll
Stoyan Danov
Alessandra Di Mariano
Javier Mora
Fernando Rastellini
Cecilia Soriano

RESEARCH ENGINEERS

Diego Aguilera
Clara Alvarado
Pere Arrom
Ferran Arrufat
Esther Blanco
Alberto Burgos
Jesús Carbajosa
Jordi Carbonell
Marc Carnicero
Miguel Ángel Celigueta
Alexis Cid
Jaime Clapés
Martí Coma
Jesús Conde
André Conde
Englantina Dani
Enrique Escolano
Nuria Ferrer
Alberto Ferríz
Óscar Fruitós
Javi Gárate
Francesc Gasparín
Mohammad R. Hashemi
Fernando Hermosilla
Jordi Jiménez
J. Salvador Latorre
Sergi Macián
África Marrero
Josep Mayós
Adrià Melendo
Anna Monros
Gerard Mor
Marc Núñez
Gonzalo J. Olivares
Moisés Ortega
Miguel Pasenau
Gilbert Pfeffer
Domingo Peñalver
Daniel Pérez
Ángel Diego Priegue
Ivan Puig

Research and Technology Development

RESEARCH ENGINEERS (cont.)

Anaïs Ramos
Jaume Roca
Francisco Rodero
Carlos A. Roig
Víctor Sande
Marcos Sanz
Sergi Saurí
Pablo L. Sierra
Joaquim Soler
Fernando A. Sossa
Alberto Tena
Francesc Turón
Pere-Andreu Ubach
Sergio Valero
Ignacio Valero
María Teresa Yubero
Claudio Zinggerling

RESEARCH STUDENTS

PhD Students

Matías Alonso
Ramón Barboza
Davide Besenzone
José R. Bravo
Fabiola Cavaliere
Javier Cipriano
Jonathan Colom
Alejandro Cornejo
Irene de Cubas
Javier Garrido
Agustina Giuliadori
Benedetto Grillone
Joaquín González
Benedetto Grillone
Sergio Jiménez
Joel Jurado
Alexandros Karkoulis
Pieman Khadivipanah
Flores Lazzari
Arisleidy Mesa
Arash Moaven
Laura Moreno
Christina Nasika
Albert Puigferrat
David Roca
Daniel Ruiz
Núria Sau
Daniel Tarragó
Riccardo Tosi
Saeed Turchi
Massimiliano Zecchetto
Ningning Zhang

Master Students

Cloe Cortés
Uxue Chasco
Julia García
Rafael Pacheco
Ricard Sánchez

Undergraduate Students

Jaime Marín
Laura Santos
Carlos Vidal

VISITING SCIENTISTS

CIMNE promotes the visits of academics and researchers from around the world. Visiting Scientists at CIMNE in 2019:

Visiting Scientists

Javier Danna
(University of Tucuman, Argentina)

Michael Ghosn
(The City Collage of New York, USA)

Juan Marcelo Giménez
CIMEC (CONICET-UNL, Argentina)

Guilmar Guimaraes
(Universidade Federal de Uberlandia, Brasil)

M^a Eugenia Gutiérrez
(Universidad Simón Bolívar, Venezuela)

Écio Naves
(Instituto Federal de Goiás, Brazil)

Lili Zhou
(Southwest University of Science and Technology, China)

VISITING SCIENTISTS

Visiting Students

Clara Argerich
(Arts et Métiers ParisTech, France)

Joao Marcos Bosi
(Universidade Regional de Blumenau, Portugal)

Marc Chung-to-Sang
(ENS Cachan, France)

Administration



GENERAL DIRECTOR

Eugenio Oñate

SCIENTIFIC DIRECTOR

Pedro Díez

PROJECT DEVELOPMENT DIRECTOR

Fernando Salazar

DIRECTOR FOR INSTITUTIONAL RELATIONS

Gabriel Bugada

MANAGING DIRECTOR

Anna Font

Administration staff in CIMNE is formed by highly qualified professionals who address the increasing needs of researchers and scientific personnel in the centre.

ACCOUNTANCY AND FINANCES

M^a Carmen Linares

(Head of Unit)

Katherine J. Brenes

Valentín Catalán

Nuria Holgado

Elisabet Laya

Cristina Luque

Patricia Rivero

COMMUNICATION

Laura Bermúdez

CONGRESS BUREAU

Cristina Vizcaya

(Head of Unit)

Sami Amin

Alessio Bazzanella

Mónica Camanforte

Beatriz Rodríguez

Marcela Silhankova

DIRECTOR SECRETARY

Mercè Alberich

Anna Maria Lozano

HUMAN RESOURCES

Irene Latorre

(Head of Unit)

Irene Martínez

PROJECT MANAGEMENT

Sandra Pérez

(Head of Unit)

Marina de la Cruz

Francisco de la Rosa

Alicia Pallarés

Jon Rodríguez

Mahavir Singh

POSTGRADUATE TRAINING

Lelia Zielonka

(Head of Unit)

Cristina Pérez

PUBLICATIONS

M^aJesús Samper

(Head of Unit)

Jesús Sánchez

SYSTEMS

Miguel Alonso

(Head of Unit)

Alberto Burgos

Aitor Lázaro

TECHNICAL STAFF

Javier Tous

TECHNOLOGY TRANSFER

Javier Marcipar

Sergio Otero



Where we are



Photos: C1 Building at Campus Nord UPC Barcelona

Headquarters

Main premises at UPC

CIMNE's main premises are located at the heart of the North Campus of Universitat Politècnica de Catalunya · BarcelonaTech.

The offices are situated at the C1 Building, adjacent to the Civil Engineering School of UPC and occupy some 1,000 m² of modern office facilities and state of the art equipment with last generation computers linked via a fast intranet and a multicore cluster for parallel computing.

This space, created in 1987, hosts around 90 CIMNE researchers and the main administration offices.

CIMNE-BARCELONA

Campus Nord UPC, C1 Building

C/ Gran Capità, S/N, 08034 Barcelona, Spain

+34 93 401 74 95

B0 Building

In September 2014 CIMNE started the construction of a new building of some 2,000 m² in the North Campus of the Universitat Politècnica de Catalunya · BarcelonaTech.

The new B0 building, that also hosts the Flumen Institute, was completed by the end of 2015. Several CIMNE researchers moved to the new facilities during the first months of 2016. This new building is equipped with modern experimental facilities for model scale testing of river dynamic and hydraulic problems and it also provides work areas for researchers at the graduate level (master, doctoral and postdocs) and for senior researchers from CIMNE and UPC · BarcelonaTech.

CIMNE-B0

Campus Nord UPC, B0 Building

C/ Gran Capità, S/N, 08034 Barcelona, Spain

+34 93 401 09 50



B0 Building at Campus Nord UPC Barcelona

CIMNE Premises

Apart from CIMNE's headquarters, located in Barcelona, CIMNE has six other branches: four premises in Spain (Castelldefels, Lleida, Madrid and Terrassa) and two legal offices around the world (US and Latin America).

The worldwide presence of the research centre is also represented by the 32 Aulas CIMNE (Joint Labs with universities all around the world).



* Points denote the number of AULAS CIMNE in each country



Premises in Spain



← CIMNE - Terrassa

CIMNE offices in Terrassa (Barcelona, Spain) opened in 2001. The premises cover an area of 150m² and house part of the department of Building Energy and Environment Group (BeeGroup).

Director: J. Cipriano

Address

Campus de Terrassa UPC
Edifici GAIA (TR14)
C/ Rambla Sant Nebridi, 22
08222 Terrassa (Barcelona), Spain
+34 93 789 91 69

CIMNE - Castelldefels →

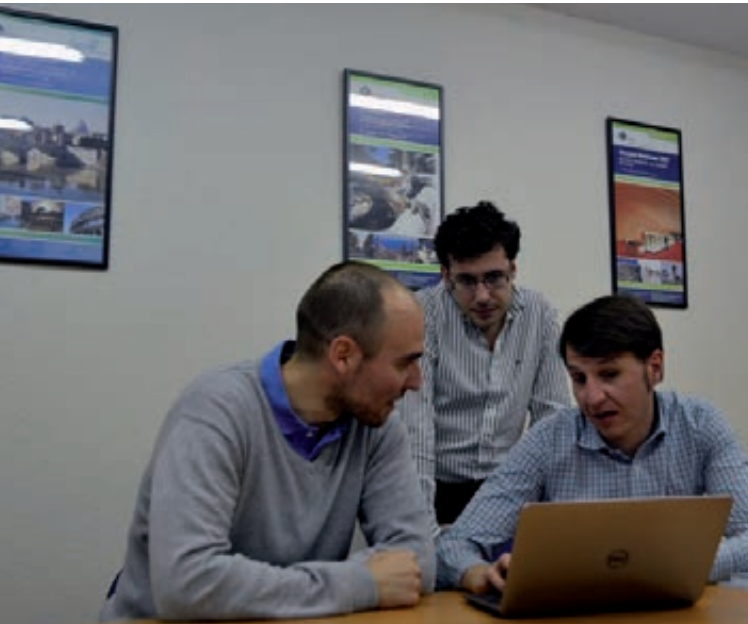
CIMNE's headquarters in the city of Castelldefels (Barcelona, Spain) were inaugurated on October 15th 2008. The facilities are located in the building CIMNE-C3 of the Mediterranean Technology Park of the UPC, and occupy 1,500m² in a new building constructed in collaboration with the UPC. The premises are shared with the Technical School of Castelldefels.

Director: J. Mora

Address

Campus del Baix Llobregat UPC
CIMNE Building C3
C/ Esteve Terradas, 5
08860 Castelldefels, Barcelona, Spain
+34 93 413 41 86





CIMNE - Madrid

CIMNE - MADRID started its activities in September 2007 and in May 2008 CIMNE opened its premises located in the centre of the city (150m²). The main goal of CIMNE Madrid is to build a strong research team in the capital and foster the links between CIMNE, the Central Government of Spain, the Technical University of Madrid (UPM) and partner companies and research centres based in Madrid.

Director: F. Salazar

Address

Paseo General Martínez Campos, 41, 9º
28010 Madrid, Spain
Tel. +34 91 319 13 59

CIMNE - Lleida



CIMNE's premises in Lleida are located at the Eurotrading building, beside the Cappont Campus of the University of Lleida (UdL). The 130 m² office is surrounded by more than 30 companies from different sectors in the same building and the proximity to the University of Lleida gives CIMNE Lleida a strategic position.

Director: J. Cipriano

Address

Eurotrading Building

Pere de Cabrera, 16, 2C
25002 Lleida

Tel: +34 873 991 354 / +34 873 991 737



International Branches

CIMNE-USA (Washington DC, USA)

CIMNE-USA is an educational and scientific research organization, affiliated with the International Centre for Numerical Methods in Engineering (CIMNE).

The objective of CIMNE-USA is leading scientific research and development projects supported by government, foundations and industry sources.

The branch also carries out educational activities related to advanced numerical methods. It participates in national and international conferences and symposia and works jointly with Aulas CIMNE, in cooperation with US and international universities. CIMNE-USA also supports visiting scientists.



Dr. David Cranmer (on the left side photo), CIMNE US Acting Executive Director, is a senior scientist at the National Institute of Standards and Technology (NIST) and advisor of many US companies. Mr. Varadaraju (Raju) Gandikota (on the right side photo) is CIMNE USA Scientific Director.

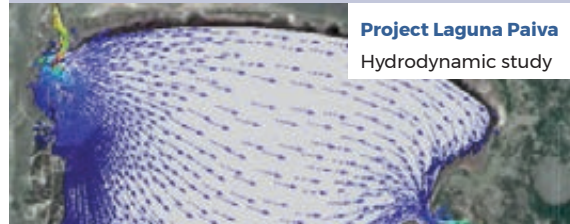
Selected RTD Projects

NICOP - Development of new Lagrangian computational methods for ice-ship interaction problems

Funded by the Office of Naval Research (ONR)

30/09/2016 - 01/10/2019

CIMNE-Latin America (Santa Fe, Argentina)



Project Laguna Paiva
Hydrodynamic study

CIMNE is represented in Latin America by the CIMNE Latin American Foundation (FCL).

The CIMNE-Latin American Foundation (FCL) is located in the city of Santa Fe (Argentina), the place where the first CIMNE Classroom in the Latin American region was created in cooperation with University of Litoral.

Since its creation, the CIMNE-Latin American Foundation has developed a wide range of activities in Latin America related to training, research and dissemination of advances in numerical methods.

Many of these projects are developed with the support of CIMNE, Aulas CIMNE, universities and public organizations.

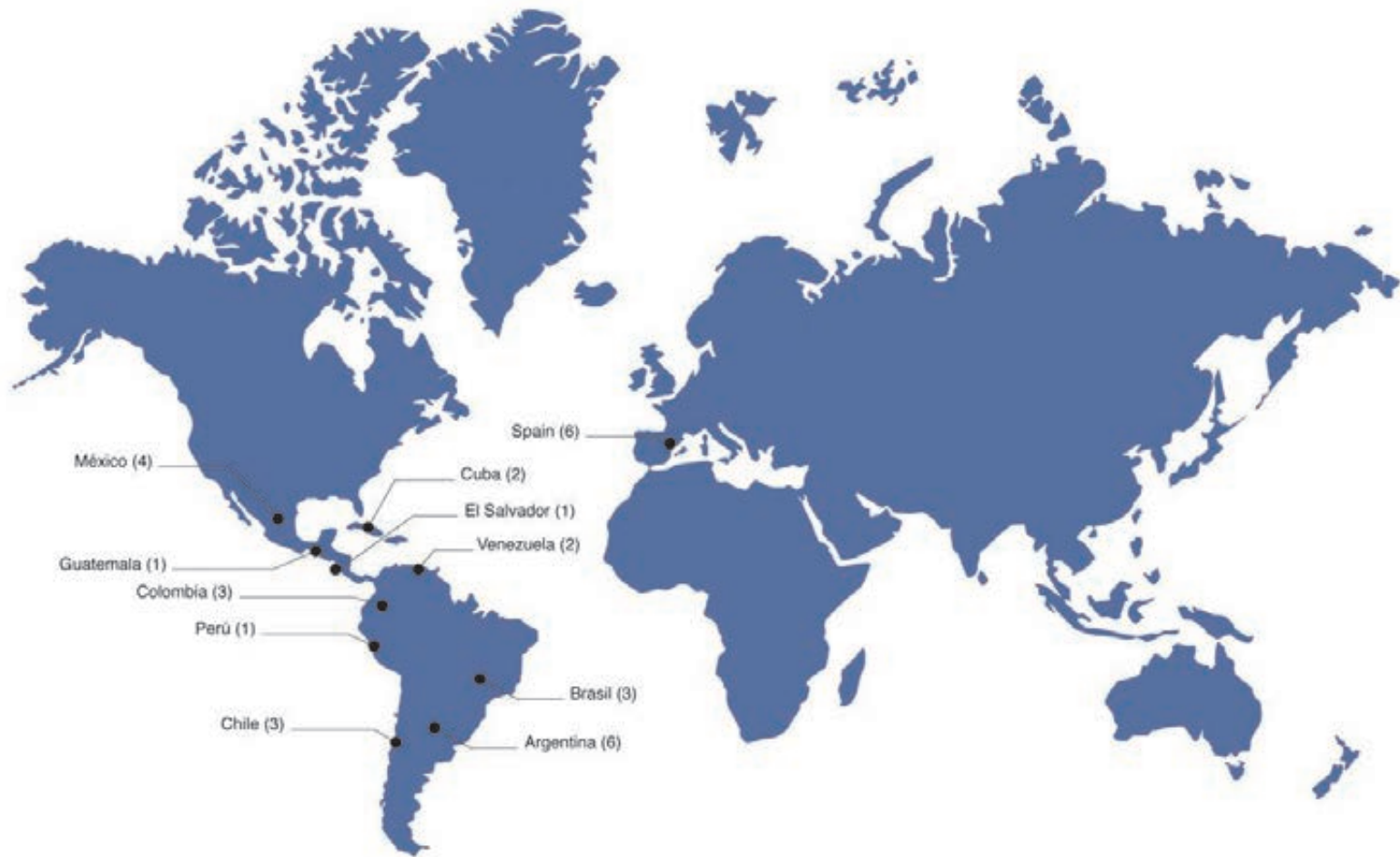
The projects in which FCL participates can be classified into the following research areas:

- Engineering and Environment
- Industrial Processes
- Numerical Methods

FCL also takes part and organises courses, seminars, workshops, among others.

Activities

Development of advanced tools for computational design of engineering materials. CIMNE-Latin America also carries out actions of representation and dissemination of numerical methods in engineering of the centre in the area.



TOTAL: **32** AULAS CIMNE

Argentina ●●●●●●

Brazil ●●●

Chile ●●●

Colombia ●●●

Cuba ●●

El Salvador ●

Guatemala ●

Mexico ●●●●

Peru ●

Spain ●●●●●●

Venezuela ●●

Aulas CIMNE

Aulas CIMNE are physical spaces (Joint Labs) for cooperation in education, research and technological development (RTD) activities created jointly by CIMNE and one or several universities.

The 32 Aulas CIMNE promote educational and training activities at graduate and postgraduate level and development of RTD projects in cooperation with companies around the world.

AULA FICH - CIMNE (Argentina)**Universidad Nacional del Litoral**Director: Gerardo FranckCreated on: October 2002Activity: Applications of numerical methods to problems related to water resources, mechanical and computer engineering.**AULA ITBA - CIMNE (Argentina)****Instituto Tecnológico de Buenos Aires**Director: Sebastián d'HersCreated on: April 2015Activity: Application development of numerical methods in the field of mechanical, naval, petroleum, chemical, electronics, electrical, industrial engineering and bioengineering.**AULA IUA - CIMNE (Argentina)****Instituto Universitario Aeronáutico**Director: Carlos SaccoCreated on: September 2002Activity: Applications of numerical methods to problems related to fluid mechanics, structures, heat transfer, etc.**AULA UNER - CIMNE (Argentina)****Universidad Nacional de Entre Ríos**Director: José Di PaoloCreated on: March 2013Activity: Applications of numerical methods to problems related to Bioengineering.**AULA UNSA - CIMNE (Argentina)****Universidad Nacional de Salta**Director: Liz NallimCreated on: April 2008Activity: Development of computer models for application in civil engineering.**AULA UNT - CIMNE (Argentina)****Universidad Nacional de Tucumán**Director: Guillermo EtseCreated on: November 2002Activity: Development of computational models of bridges (degradation and repair mechanisms).**AULA FEMEC - CIMNE (Brazil)****Universidad Federal de Uberlândia**Director: Sonia GoulartCreated on: April 2004Activity: Forming process applications, structural design and biomechanics.**AULA IFSP - CIMNE (Brazil)****Instituto Federal de Educação, Ciência e Tecnologia de São Paulo**Director: Écio NavesCreated on: July 2009Activity: Applications of numerical methods in engineering problems in forming processes, solid mechanics and biomechanics.**AULA ISF - CIMNE (Brazil)****Instituto Federal de Educação, Ciência e Tecnologia de Goiás**Director: Écio NavesCreated on: October 2018Activity: Applications of numerical methods in engineering problems.**AULA DIMEC - CIMNE (Chile)****Universidad Técnica Federico Santa María**Director: Franco PerazzoCreated on: March 2004Activity: Numerical methods in mechanical engineering. Development of numerical methods without mesh. Applications in Engineering.**AULA FIULS (Chile)****Universidad La Serena**Director: Ernesto CastilloCreated on: 2019Activity: Applications of numerical methods to problems in Engineering.**AULA PUCV (Chile)****Pontificia Universidad Católica de Valparaíso**Director: Juan Carlos VielmaCreated on: October 2017Activity: Numerical Methods for the evaluation of seismic vulnerability of structures, dynamic response of non-linear structures and pre-seismic reinforcement techniques.**AULA UNC - CIMNE (Colombia)****Universidad Nacional de Colombia**Director: Jairo Andrés ParedesCreated on: June 2005Activity: Numerical methods applied to civil engineering.**AULA UNIMAR - CIMNE (Colombia)****Universidad Mariana de Colombia**Director: Jorge Hernán López MeloCreated on: May 2018Activity: Structural analysis.

AULA UNIANDES - CIMNE (Colombia)**Universidad de los Andes**Director: René MeziatCreated on: January 2003Activity: Teaching and research in numerical methods, optimization, variational principles and computational mechanics.**AULA UCI - CIMNE (Cuba)****Universidad de las Ciencias Informáticas**Director: Jorge GulínCreated on: October 2015Activity: Development of computational models and tools with application in high performance computation.**AULA UCLV - CIMNE (Cuba)****Centro de Investigación de métodos computacionales y numéricos en la ingeniería. Universidad Central de las Villas**Director: Carlos RecareyCreated on: July 2003Activity: Modelling and analysis of structures and grounds to the application of numerical methods.**AULA UCA - CIMNE (El Salvador)****Universidad Centroamericana "José Simeón Cañas" UCA**Director: Mauricio PohlCreated on: February 2010Activity: Civil eng. applications and multi objective optimization and applications.**AULA UMG - CIMNE (Guatemala)****Universidad Mariano Gálvez**Director: Rolando TorresCreated on: February 2011Activity: Development of computer models for application in civil engineering.**AULA CIMAT - CIMNE (Mexico)****Centro de Investigaciones en Matemáticas**Director: Salvador BotelloCreated on: June 2006Activity: Applied mathematics, numerical methods, engineering and statistical analysis.**AULA UGTO - CIMNE (Mexico)****Universidad de Guanajuato**Director: Mabel MendozaCreated on: January 2002Activity: Civil engineering applications and multi objective optimization and applications.**AULA MORELIA - CIMNE (Mexico)****Universidad Michoacana de San Nicolás de Hidalgo**Director: Francisco DomínguezCreated on: October 2015Activity: Civil, mechanic and electric engineering.**AULA ITESM - CIMNE (Mexico)****Inst. Tecnológico de Estudios Superiores de Monterrey**Director: Sergio GallegosCreated on: May 2009Activity: Applications of numerical methods in civil engineering.**AULA PUCP - CIMNE (Peru)****Universidad Católica de Perú**Director: Rosendo FrancoCreated on: April 2009Activity: Modelling and analysis of structures and grounds to the application of numerical methods.**AULA ESEIAAT - CIMNE (Spain)****UPC - BarcelonaTech Terrassa**Directors: Roberto Flores; Óscar FruitósCreated on: April 2007Activity: Industrial and aeronautical engineering**AULA EEBE - CIMNE (Spain)****Escuela Técnica de Ingeniería Industrial**Director: Daniel Di CapuaCreated on: July 2001Activity: Development of numerical methods in industrial and civil engineering.**AULA ETSINO - CIMNE (Spain)****Universidad Politécnica De Cartagena**Director: José GutiérrezCreated on: May 2018Activity: Development of numerical naval engineering.

AULA FNB - CIMNE (Spain)



Facultat de Nàutica de Barcelona

Director: Julio García

Created on: March 2002

Activity: Applications of numerical methods to problems related to marine engineering.

AULA UDL - CIMNE (Spain)



Universitat de Lleida

Director: Jordi Cipriano

Created on: July 2004

Activity: Numerical methods applied to the physics of buildings and renewable energy.

AULA UPM - CIMNE (Spain)



Universidad Politécnica de Madrid

Director: Rafael Morán; Miguel Ángel Toledo

Created on: May 2010

Activity: Applications of numerical methods in civil engineering.

AULA UC - CIMNE (Venezuela)



Universidad de Carabobo

Director: David Ojeda

Created on: April 2009

Activity: Applications of numerical methods in optimization and inverse problems in engineering failure analysis.

AULA UCLA - CIMNE (Venezuela)



Universidad Centrooccidental "Lisandro Alvaro" (UCLA)

Director: Juan Carlos Vielma

Created on: October 2008

Activity: Applications of numerical methods to civil engineering problems.



Biodigesters project in Bolivia



Activities in Asia Pacific

China

For over 10 years, CIMNE has been collaborating with research organizations, universities and companies in the People's Republic of China in a number of fruitful cooperation agreements, RTD projects and some educational activities.

CIMNE has strong links with the most renowned scientific institutions in China, such as Peking University, Tsinghua University and several research centres of the Chinese Academy of Sciences or the Chinese Aeronautical Establishment.

Supported by the 6th and 7th Framework Programme and the Horizon 2020 of the European Union, CIMNE has carried out the coordination on the European side of a series of projects aimed at promoting joint EU-China research in aeronautics. CIMNE also participates in research projects in areas of risk assessment of natural disasters.

The most relevant activities with China in 2019 have been:

» **DRAGY: Drag Reduction in Turbulent Boundary Layer via Flow Control**

H2020-MG-2015

Coordinated by CIMNE

01/04/2016 - 30/06/2019

» **ECO-COMPASS: Ecological and Multifunctional Composites for Application in Aircraft Interior and Secondary Structures**

H2020-MG-2015

Coordinated by DLR

01/04/2016 - 30/06/2019

» **EMUSIC: Innovative Methodologies for reducing Aircraft noise Generation and Emission**

H2020-MG-2015

Coordinated by DLR

01/04/2016 - 31/03/2019

» **IMAGE: Innovative Methodologies and technologies for reducing Aircraft noise Generation and Emission.**

H2020-MG-2015

Coordinated by Chalmers

01/04/2016 - 30/06/2019

Singapore

CIMNE has collaborated for many years with Singaporean research organizations and companies in the field of biomedicine, energy and marine engineering.

The most outstanding example of research collaboration with Singaporean institutions is the study carried out in cooperation with the Tan Tock Seng Hospital and NTU on mechanistic and pathology of the genesis, growth, and rupture of abdominal aortic aneurysms.

Research

CIMNE, Centre of Excellence Severo Ochoa

The International Centre for Numerical Methods in Engineering has received the Severo Ochoa accreditation. CIMNE became thus one of the six “Centre for Excellence Severo Ochoa” accredited by the Spanish State Research Agency (attached to the Spanish Ministry of Science, Innovation and Universities).



EXCELENCIA
SEVERO
OCHOA

For the first time, CIMNE enters in the list of the centres with the Seal of Excellence Severo Ochoa, together with CREAM, DIPC, IDAEA and IS-Global, while IBEC repeats after being selected in the 2015 call.

Severo Ochoa Centres will receive one million euros every year during four years (2019-2023). This funding will be invested in incorporating some 50 new researchers in CIMNE for the period 2020-2023 (30 PhDs and 20 Postdocs).

With this action, the Ministry of Science, Innovation and Universities aims to promote high-impact research carried out in the R&D centres of Spain.

Severo Ochoa Centres stand out both for the international notoriety of the scientific contributions they make, and for their innovative capacity and their intense relationship with the business sector. They are also world reference centres capable of attracting international talent.

Research Challenges & Goals

4 Research Challenges (*)

CIMNE has reinforced and reorganized its current research activities in order to contribute to overcome Four Scientific Challenges of high impact to the welfare of citizens:

RCh1. CONSTRUCTION & TRANSPORT:

The enhanced design of buildings and constructions, transport infrastructure and vehicles.

RCh2. ENVIRONMENT, ENERGY &

SECURITY: A more environmentally-friendly and safer planet.



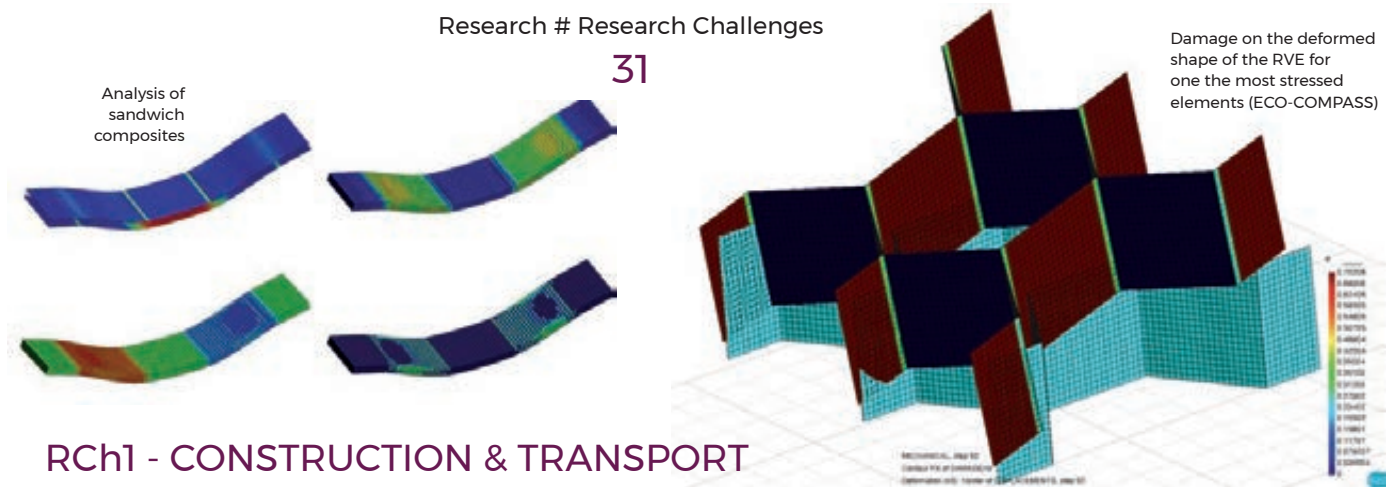
(*) These challenges are aligned with the research and technical development (RTD) priorities of European Commission (EC) H2020 priorities and the Plan Estatal de Investigación Científica y Técnica y de Innovación 2017-2020.

RCh3. MANUFACTURING:

A more competitive industrial sector.

RCh4. MATERIALS:

The development of new materials with functional properties for engineering applications.



RCh1 - CONSTRUCTION & TRANSPORT

Enhanced design of buildings, constructions, transport infrastructure and vehicles.

RCh1.1. NEW NM FOR ANALYSIS OF CONSTRUCTIONS WITH NEW MATERIALS

Design and construction of new sustainable, safer and affordable buildings and infrastructures.

RCh 1.2. NEW NM FOR ANALYSIS OF CONSTRUCTIONS WITH NEW MATERIAL

Design of new aircrafts with improved features, such as reduced energy consumption and environmental impact, and increased safety of air transport.

RCh 1.3. NEW NM FOR ENHANCED DESIGN OF SHIPS AND MARINE STRUCTURES WITH IMPROVED PERFORMANCE AND ENVIRONMENTAL FEATURES

Design and construction of environmentally friendly and faster ships that can meet the challenges of the maritime transport.

RCh2 - ENVIRONMENT, ENERGY & SECURITY

Towards a more environmental-friendly and safer planet.

RCh 2.1. NM FOR ENVIRONMENTAL BIOTECHNOLOGY

New Numerical Methods for:

- Wetlands for wastewater treatment;
- Water bodies, the atmosphere, animals & lands.
- Surface reactive barriers for reducing the risk of organic compounds to human and ecosystems

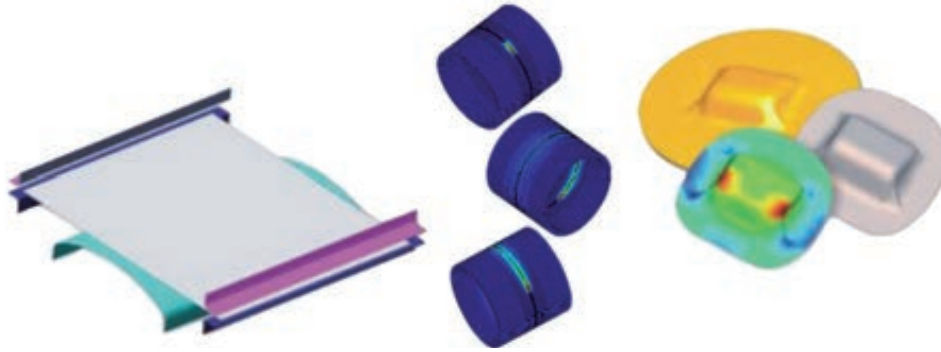
RCh 2.2. ADVANCED NM FOR THE PREDICTIVE IMPACT OF HAZARDS ON THE BUILT INFRASTRUCTURE AND THE ENVIRONMENT

Development of NM, fed with information from satellites, drones and monitoring devices at the small scale, processed via Big Data techniques, for studying:

- The effect of water hazards on constructions and landscape.
- The effect of earthquakes on the built environment
- The motion of pedestrians in hazards.
- Air pollution in cities.
- The effect of explosions and fire on structures.
- The creep-like motion and evolution of landslides.
- The vulnerability and resilience of transport networks in hazards.

RCh3 - MANUFACTURING

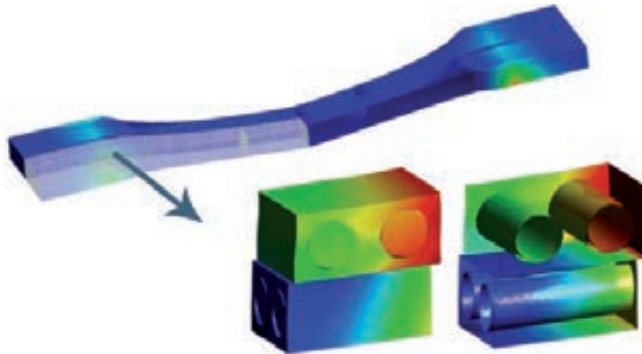
Numerical Methods for the predictive design of forming manufacturing processes to achieve affordable final products made of metallic and polymer-based materials with the desired functionalities.



- **Applications:** additive manufacturing, sheet stamping, casting, welding, forging, machining, rolling and extrusion, etc.

RCh4 - MATERIALS

Numerical Methods (NM) for analysis and predictive design of multifunctional architected materials.



Development of new materials with functional properties for engineering applications:

- In photonics and acoustics for attenuating selected ranges of frequencies
- To produce ultra-light materials with desired mechanical properties
- Nonlinear metamaterials exhibiting extreme shock absorbing and restitution capacities
- Biological active meta-materials (organ-on-a-chip devices)

RTD Areas and Groups

RTD AREAS AND GROUPS		
CIVIL AND ENVIRONMENT ENGINEERING		COMPUTATIONAL MATERIALS DESIGN & ANALYSIS
BUILDING, ENERGY & ENVIRONMENT PI: Jordi Cipriano	MACHINE LEARNING IN CIVIL ENGINEERING PI: Fernando Salazar	COMPUTATIONAL DESIGN & ANALYSIS OF ENGINEERING METAMATERIALS PI: Xavier Oliver
DISASTER RISK AND RESILIENCE PI: Lílíana Carreño	RIVER DYNAMICS AND HYDROLOGIC ENGINEERING (FLUMEN INSTITUTE) PI: Ernest Bladé	MECHANICS OF ELECTROACTIVE MATERIALS PI: Irene Arias
GEOMECHANICS PI: Antonio Gens	STRUCTURAL MECHANICS PI: Eugenio Oñate	SOFT AND LIVING MATERIAL INTERFACES PI: Marino Arroyo
HYDROGEOLOGY PI: Xavier Sánchez-Vila		
ENGINEERING MECHANICS AND PROCESSES		INNOVATION SUPPORT AND TECHNOLOGY TRANSFER
BIO-MEDICAL ENGINEERING PI: Eduardo Soudah		INFORMATION AND COMMUNICATION TECHNOLOGY PI: Jordi Jiménez
FLUID MECHANICS PI: Ramon Codina		PRE AND POST PROCESSING PI: Abel Coll
INDUSTRIAL MANUFACTURING PROCESSES PI: Michele Chiumenti and Miguel Cervera		VALORIZATION OF RESEARCH AND TECHNOLOGY TRANSFER PI: Javier Marcipar
INNOVATIVE ALGORITHMS AND HPC TECHNIQUES		TRANSPORT
CREDIBLE DATA-DRIVEN MODELS PI: Pedro Díez		AERONAUTICS PI: Jordi Pons
KRATOS MULTIPHYSICS PI: Riccardo Rossi		CENIT - INNOVATION IN TRANSPORT PI: Sergi Saurí
INNOVATIVE ALGORITHMS FOR FAST ACCURATE COMPUTING PI: Antonio Huerta		NAVAL AND MARINE ENGINEERING PI: Julio García
LARGE SCALE SCIENTIFIC COMPUTING PI: Santiago Badia		

Building, Energy & Environment

The Building Energy and Environment Group (BEE Group) is an autonomous department of the International Centre for Numerical Methods in Engineering (CIMNE) involving over 15 researchers (Physics, Engineering, ICT, Environmental Science and Statistics specialists). It was founded in 2001 and has two main offices, one in the GAIA building of the UPC Campus in Terrassa and the other in the EUROTRADE building in Lleida.

BEE Group scouts the science world looking for knowledge and inspiration. Developing better building energy management by improving precision, providing a faster response, setting up adaptive and predictive control and making buildings more responsive to users' requirements and wishes. Making energy data more useful to professionals and companies by reducing cost and increasing applicability and reliability through Big Data Analytics, personalized energy services and adaptive visual interfaces and mobile applications.

BEE Group collaborates with national and international leading research centers and public and private companies to develop research projects related to energy, buildings and the environment.

Research

- Demand response in buildings. **PI: Gerard Mor**
- Energy empowerment and user behavior. **PI: Stoyan Danov**
- Big Data analytics for energy efficiency in buildings. **PI: Jordi Carbonell**
- Bio-digesters. **PI: Jaime Martí**
- nZEBs and Energy positive living. **PI: Jordi Cipriano**

Staff

Jordi Cipriano (**Leader**)

Jordi Carbonell

Stoyan Danov

Eloi Gabaldón

Benedetto Grillone

Florencia Lazzari

Jaime E. Martí

Josep Mayós

Gerard Mor

Daniel Pérez



On-going RTD Projects

EDI-Net - The Energy Data Innovation Network

EC - H2020 (2014-2020)

Coordinator: DMU

01/03/2016 - 01/03/2019

EKATE - Gestión de Energía Eléctrica Fotovoltaica y Autoconsumo Compartido en la zona transfronteriza Francia-España, utilizando tecnología "Blockchain" e "Internet of Things (IoT)"

EC - Interreg POCTEFA

Coordinator: ESTIA

01/01/2018 - 31/05/2022

FEM IOT - Connected Street Trial Lab

GENCAT - Activitats Emergents

Coordinator: I2CAT

02/05/2019 - 30/04/2021

FCU - Fortalecimiento de la cooperación universitaria AECID

Coordinator: ISF

01/09/2017 - 30/03/2019

FLEXCoop - Democratizing energy markets through the introduction of innovative flexibility-based demand response tools and novel business and market models for energy cooperatives

EC - H2020 (2014-2020)

Coordinator: Fraunhofer

01/10/2017 - 30/09/2020

GAVIUS - From reactive to proactive public administrations

EC - UIA Initiative

Coordinator: Ajuntament de Gavà

01/09/2019 - 31/08/2022

REFER - Reducció Energètica i Flexibilitat en Edificis en Rehabilitació

ACCIO - Projectes col·laboratius recerca industrial i/o innovació

Coordinator: COMSA EMTE, S.L.

01/06/2016 - 31/05/2019



SENSEI - Smart Energy Services Integrating the Multiple Benefits from Improving the Energy Efficiency of the European Building Stock

EC - H2020 (2014-2020)

Coordinator: IEACP

01/09/2019 - 31/08/2022

SHERPA - Shared knowledge for Energy renovation in buildings by Public Administrations

EC - MED Programme 2014-2020

Coordinator: GENCAT

27/09/2016 - 31/10/2019

Sim4Blocks - Simulation Supported Real Time Energy Management in Building Blocks

EC - H2020 (2014-2020)

Coordinator: ZAFH

01/04/2016 - 31/03/2020

SIE3 - Sistema de Información Energética de Edificios en Ecuador

AECID

Coordinator: CIMNE

01/04/2017 - 31/06/2019

Technology transfer

The BEE Group collaborates with national and international companies and institutions since 2001, a long journey with more than 41 national and international RTD projects that has carried on a trade to emerge two new business "Start-ups": Inergy (created in 2012) and Beedata Analytics (created in 2017).

beedata

inergy
R&D Group Cimne Energy, S.L.

Further information at "Spin-off Companies" section at page 80.

Disaster Risk and Resilience

The Disaster Risk and Resilience group has developed numerous natural hazards and risk modelling studies for several countries in the Latin America and Caribbean Region, Europe, South-East Asia, and Indian Ocean.

The corresponding country's governments have used their results for risk reduction, land use planning, financial risk transfer, insurance and reinsurance, and for integrated disaster risk management. The studies have been developed for different resolution levels: regional, national, and city levels.

The developments performed on vulnerability and risk evaluation and on the holistic risk approach, as well as on the development and use of risk indicators and urban risk scenarios, are well known in the scientific community due to the numerous articles published by the members of the group.

Research

- Disaster risk evaluation at different levels. **PI: Liliana Carreño**
- Development of indicators for disaster risk evaluation, resilience and disaster risk management **PI: Liliana Carreño**

On-going RTD Projects

E-ZUANA - Evaluación de la vulnerabilidad y el riesgo de Zonas Urbanas expuestas a Amenazas Naturales y Antrópicas

MINECO - Retos Investigación: Proyectos de I+D+i

Coordinator: CIMNE

30/12/2016 - 29/12/2019

UKRI GCRF HUB - Urban Disaster Risk Hub

UKRI - Interdisciplinary Research Hubs

Coordinator: FLACSO

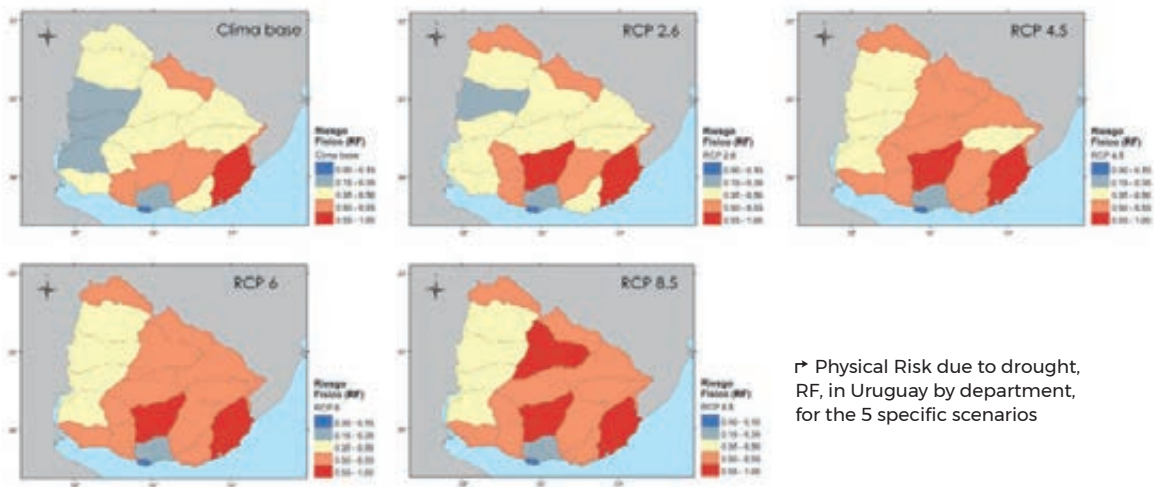
01/03/2019 - 12/02/2024

Staff

M. Liliana Carreño (Leader)

Álex H. Barbat

Mario Andrés Salgado



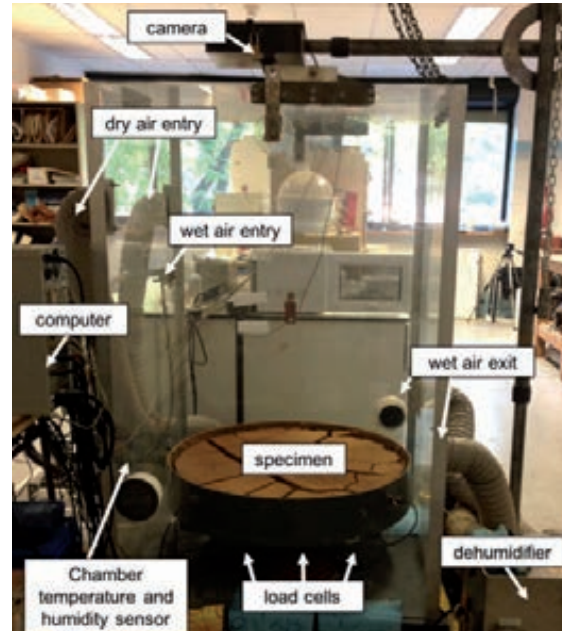
Geomechanics

The research work of the Geomechanics Group focuses on the contribution to fundamental understanding and modelling of soil and rock behavior, the development of advanced computational tools and testing techniques at laboratory scale and the participation in applied engineering projects.

Achieving a proper balance among these aspects has been a permanent objective of the group over the years. The research of the group and the developed software are a reference in the analysis of coupled thermal, hydraulic, mechanical and chemical processes in porous media applied to the analysis and design of underground structures (tunnels, foundations, georeservoirs, etc), earth and rockfill dams and fluid-soil-structure interaction problems.

Research

- Coupled multi-physical analyses of porous media. Application to radioactive waste disposal. **PIs: Antonio Gens and Sebastian Olivella**
- Numerical analysis of large-scale infrastructure projects. **PI: Antonio Gens**
- DEM and PFEM modelling of penetration problems in Geomechanics. **PIs: Antonio Gens and Marcos Arroyo**
- Cracking in desiccating soils. **PIs: Alberto Ledesma and Pere Prat**
- Unsaturated Soil Mechanics. Experimental and theoretical advances. Application to embankments, dams and radioactive waste disposal. **PI: Eduardo Alonso**
- Landslides. Large displacements, thermal interaction, creeping motion and earthquake-induced landslides. Material Point Method modelling. **PI: Núria M. Pinyol**
- Rockfill Mechanics. Particle breakage. Relative humidity effect. DEM modelling. **PI: Eduardo Alonso**
- Crystal Growth in Anhydritic Rocks. Swelling and structure interaction. **PI: Anna Ramon**
- Multi-physics experiments and modelling of geomaterials. **PI: Enrique Romero**
- Multi-scale experiments and analyses of geomaterials. **PIs: Enrique Romero and Laura González-Blanco**
- Coupled multi-physical analyses of porous media. Application to energy geotechnics (methane hydrates) and soil-vegetation-atmosphere interaction. **PI: Jean Vaunat**
- FEM for coupled problems in geotechnical engineering. Particle-based and discrete element methods for geomechanical problems. **PIs: Antonio Gens and Sebastian Olivella**
- Constitutive models and numerical methods for analysis of unsaturated soils and rocks. **PI: E. Alonso**



Environmental chamber to study cracking in desiccating soils

Geomechanics

Ongoing projects

EURAD - European Joint Programme on Radioactive Waste Management

H2020 (2014-2020) - EURATOM

Coordinator: AALTO

01/06/2019 - 31/05/2024

TERRE - Training Engineers and Researchers to Rethink geotechnical Engineering for a low carbon future - H2020 (2014-2020) - EC

Coordinator: University of Strathclyde

01/11/2015 - 31/10/2019

LOOK - Extracción masiva y no destructiva de información en pruebas experimentales

Proyectos Explora Ciencia y Explora Tecnología - MCIU

Coordinator: CIMNE - 01/11/2018 - 30/10/2019

Staff

Antonio Gens (Leader)

Eduardo Alonso (Leader)

Matías Alonso

Clara Alvarado

Ramón Barboza

Gaia di Carluccio

Alessandra Di Mariano

Alessandro Fraccica

Daniel A. García

Laura González

Peiman Khadivipanah

Alberto Ledesma

Laura Martínez

Arisleidy Mesa

Sebastian Olivella

Ivan Puig

Anna Ramon

Alfonso Rodríguez

Jatnna A. Sánchez

Núria Sau

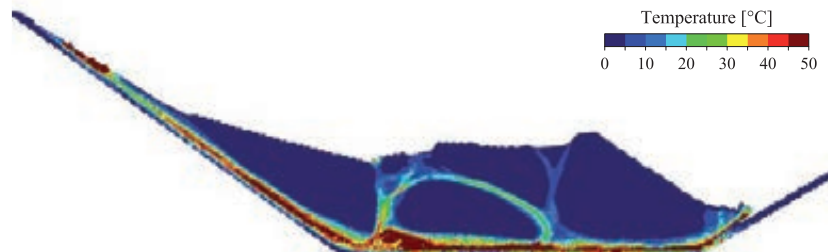
Fernando A. Sossa

Daniel Tarragó

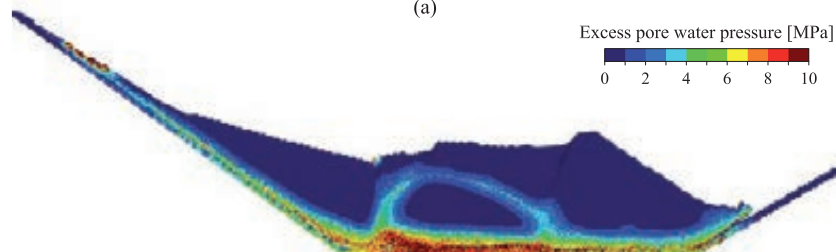
Erdem Toprak

Saeed Tourchi

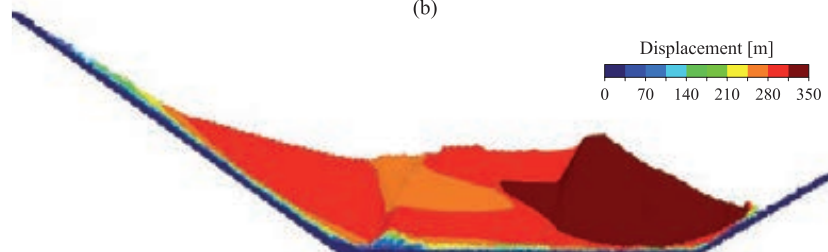
María Teresa Yubero



(a)



(b)



(c)

Hydrogeology

The Hydrogeology Research Group conducts research and knowledge transfer to society in the fields of subsurface hydrology and biogeochemistry. The Group works on the characterization of permeable media by hydraulic data, hydrochemical and environmental isotope. Applications include groundwater resources, aquifer management, saltwater intrusion, managed aquifer recharge, and transport of pathogenic microorganisms in the subsurface.

The methods span several scales, from the pore to regional aquifers, strongly based on quantitative methods, with the use of numerical modeling of flow and mass transport including bio catalysed chemical reactions. Emphasis is placed on process understanding, based on experimental efforts at the laboratory and the field, leading to model conceptualization of complex phenomena in the field of Water Resources that need to be addressed by new computing tools.

Research

- New numerical methods for analysis of flow, transport, and hydro-geohazards in porous media. Develop, test and apply Random Walk Particle Tracking methods for the modelling of microbial pathogens and contaminants in multiporosity systems, with the ultimate objective to assess the risk to human health and ecosystems. **PI: D. Fernández-García**
- Hydro-bio-geo-chemical processes in managed aquifer recharge practices. Managed Aquifer Recharge activities can improve the quality of the recharging water by enhancing the reduction-oxidation processes taking place along the infiltration path and in the mixing area. **PI: X. Sánchez-Vila**
- Multicomponent reactive transport, emerging organic contaminants (EOCs) and associated risk. Besides traditional pollutants, EOCs have been routinely detected in groundwater. New methods for understanding and modelling the fate of EOCs in groundwater are being developed, with strong understanding of the degradation paths of organic compounds. **PI: X. Sánchez-Vila**



Staff

Xavier Sánchez-Vila (**Leader**)
Daniel Fernández-García

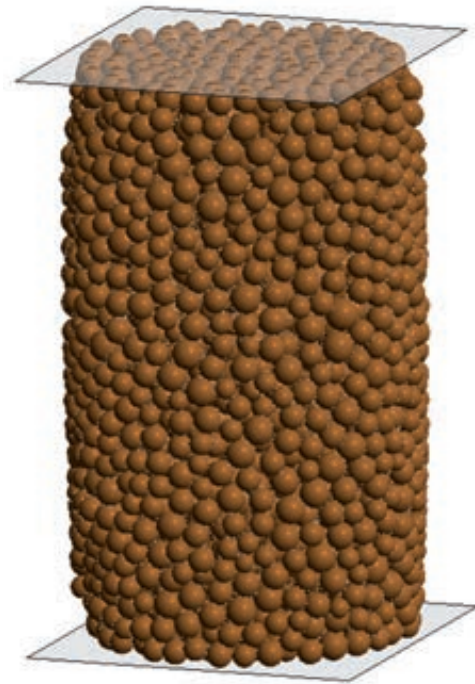
Machine Learning in Civil Engineering

The main objective of the group is to solve complex engineering problems by applying machine learning techniques with data obtained from sensors and numerical models.

The main area of activity is the field of hydraulic works: dams, spillways and water supply networks. However, these same techniques have been applied in the analysis of geomaterials such as railway ballast or landslides. The group has a strong background in the use of machine learning techniques in health monitoring of dams for anomaly detection and predictive maintenance.

At present, we are developing methodologies for the efficient quantification of uncertainty in complex problems, combining machine learning and advanced numerical methods. The group has a clear practical approach, and includes among its capabilities the development of customized user interfaces.

New areas of application for machine learning techniques include water quality prediction and wastewater disinfection through advanced oxidation processes.



Research

- **Machine Learning for health monitoring in dams (PI: Fernando Salazar)**

Development of predictive models based on machine learning and monitoring data for early detection of anomalies and interpretation of dam behavior.

- **Numerical modelling of granular materials with DEM. (PI: Joaquín Irazábal)**

Development and application of an implementation of the Discrete Element Model for the analysis of granular geomaterials, with an emphasis in railway ballast.

- **Operation of water supply networks. (PI: David J. Vicente)**

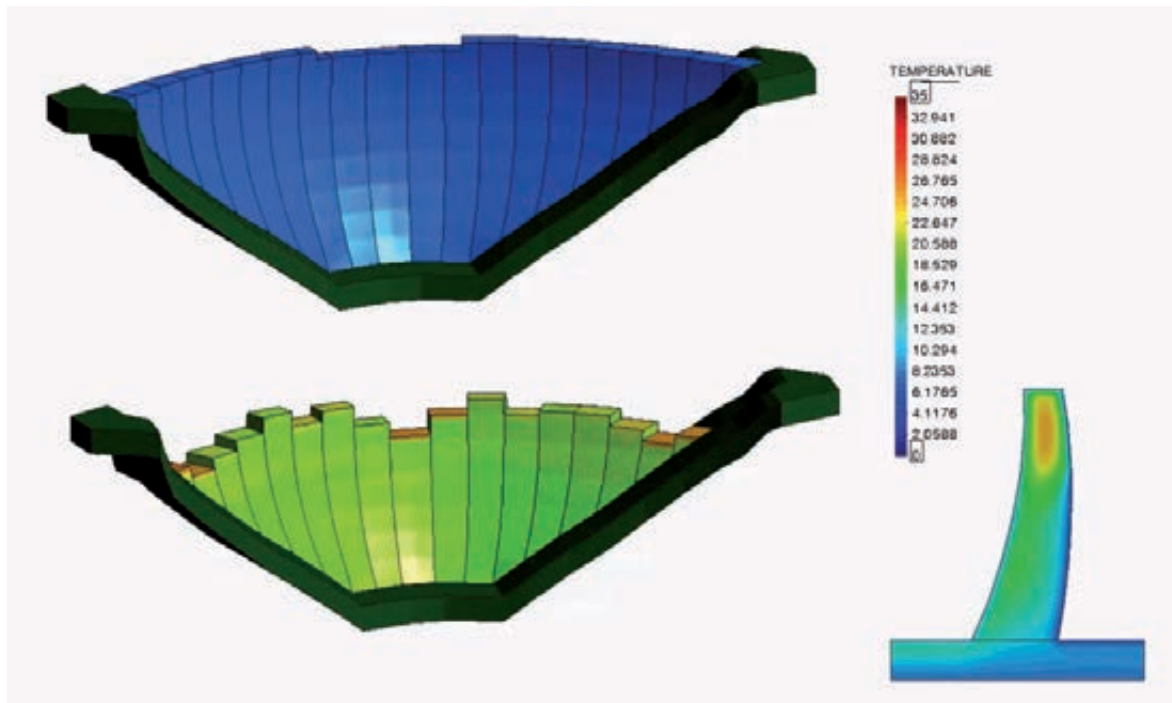
Development of advanced numerical models of water distribution systems. Water demand prediction and leakage management (including estimation, detection and isolation) by combining statistical analysis, machine learning and numerical modelling.

- **Numerical modelling of hydraulic structures. (PI: Javier San Mauro)**

Hydraulic analysis of complex, 3D phenomena such as shockwaves or aeration in spillways and bottom outlets. Non-conventional spillways involving fluid-structure interaction. Development of tailored GUIs.

- **Efficient uncertainty quantification in dam safety assessment (PIs: Fernando Salazar and Joaquín Irazábal)**

Development of hybrid methodologies, combining machine learning and numerical methods to account for uncertainty in complex settings: non-linear, transient and high dimension problems.



On-going RTD Projects

COFRE - Diseño Industrial de una COMpuerta Fusible RECuperable para la mejora de la Seguridad Hidrológica de las Presas

MCIU - Retos Colaboración: Proyectos I+D

Coordinator: VEMSA

01/07/2018 - 30/06/2021

HIRMA - Desarrollo y validación de una aplicación para la determinación del hidrograma de rotura de presas de materiales sueltos, a partir de la configuración geomecánica particular

MEIC - Retos Colaboración: Proyectos I+D

Coordinator: INCLAM

01/09/2016 - 31/12/2020

PABLO - Prototipo de Aliviadero de BLOques en forma de cuña

MCIU - Retos Colaboración: Proyectos I+D

Coordinator: PREHORQUI

01/07/2018 - 30/06/2021

SMILER - Desarrollo de un Sistema basado en Machine Learning para la Reducción de pérdidas en redes de distribución de agua

MCIU - Retos Colaboración: Proyectos I+D

Coordinator: INCLAM

01/07/2018 - 31/12/2020

TRISTAN - Nuevas herramientas computacionales para el estudio de seguridad de presas basado en análisis de fiabilidad New computational Tools for Reliability-based dam SafeTy Assessment

MCIU - Retos Investigación

Coordinator: CIMNE

01/01/2019 - 31/12/2021

Staff

Fernando Salazar (Leader)

André Conde

Joaquín Irazábal

Jaime E. Martí

Javier San Mauro

David J. Vicente

River Dynamics and Hydrologic Engineering (Flumen Institute)



The FLUMEN Institute is the outcome of merging the FLUMEN RTD group existing since 2005 at the School of Civil Engineering of UPC - BarcelonaTech and CIMNE, bringing together the numerical and experimental expertise of FLUMEN RTD group in hydraulics with the broad experience of CIMNE on numerical methods, computer simulation and integration of decision support systems.

The objectives of FLUMEN are the promotion of RTD and technology transfer activities in the field of River Dynamics and Hydrologic Engineering.

FLUMEN is an Academic Research Institute affiliated with the Technical University of Catalonia (UPC) and CIMNE. FLUMEN was founded by the Government of Catalonia (Generalitat de Catalunya) through the order ECO/305/2012 on October 3rd (DOGC October 17th) and it is an interdisciplinary research group (SGR 1139). The FLUMEN Institute is actively engaged in research activities, consulting, training and technology transfer in relation to hydrology and river dynamics. When first established in the 1980's the experience of the Flumen Research Group was incorporated.

These activities have been developed and perpetuated inside the framework provided by the School of Civil Engineering of Barcelona, and the Department of Civil and Environmental Engineering of UPC.

Research

- River hydrodynamics.
- Urban hydrology.
- Reservoir dynamics.
- Dam hydraulics.
- Irrigation canals exploitation.
- Development of methodologies for using remote sensing in the study of the thermal and hydrodynamic behaviour of water bodies.
- Flow-soil-structure interaction.

Staff

Ernest Bladé Castellet (**Leader**)

Gonzalo Olivares

Anaïs Ramos

Marcos Sanz

Structural Mechanics

The objective of the Structural Mechanics Group is the development of innovative numerical methods for analysis of structures of standard materials (metallic materials and concrete), as well as structures incorporating new materials such as composites and hybrid materials.

The numerical methods developed by the group include the finite element method (FEM) and a number of particle-based computational techniques, such as the discrete element method (DEM) and the particle finite element method (PFEM), among others.

Emphasis is put in the combination of the FEM and particle-based techniques for the solution of multidisciplinary problems in solid and structural mechanics involving multi-physics situations such as thermal-mechanical coupling, fluid-soil-structure interaction and frictional contact effects, among others.

Applications include the analysis of structures in the civil and environmental engineering sector, aerospace structures, marine structures and structural components in surface transport vehicles (cars, trucks, trains, ships, etc.) and structures in the oil and gas sector, among others.

Research

- Numerical methods based on the Finite Increment Calculus (FIC) for accurate and fast solution of problems in continuum and structural mechanics. **PIs: E. Oñate and I. de Pouplana.**
- Finite element methods (FEM) for nonlinear analysis of solids and structures with standard and composite materials. Applications in the building and construction sector and the transport sector. **PIs: X. Martínez, F. Rastellini and E. Oñate.**
- Innovative interface elements for modelling discontinuities in solids. Applications to the flow in fractured porous media and delamination of composites, among others. **PI: I. de Pouplana.**
- Particle-based methods for analysis of particulate flows. Applications to the modelling and simulation of suspended particles in fluids. **PI: G. Casas.**
- Particle Finite Element Method (PFEM) for multidisciplinary coupled problems in engineering. Applications to the modelling and simulation of environmental problems accounting for fluid-soil-structure interaction. **PIs: A. Franci and E. Oñate.**
- Particle Finite Element Method (PFEM) for multidisciplinary problems in solid mechanics. Applications to the modelling and simulation of machining and blanking processes in the manufacturing industry. **PI: J. M. Carbonell.**
- Discrete element methods (DEM) for analysis of non-cohesive and cohesive materials. Coupling of DEM, FEM and PFEM procedures. Applications to problems in the oil and gas industry. **PIs: M. A. Celiguetta, G. Casas and I. de Pouplana.**
- Rotation-free triangular elements for analysis of plate and shell structures. Applications to sheet metal forming problems and analysis of thin structures and structural membranes. **PIs: E. Oñate and J. M. González.**
- DEM-FEM approach for analysis of particulate flows and multi-fracture of materials and structures. Applications to the failure analysis of concrete structures and geo-materials. **PIs: F. Zárata and E. Oñate.**
- Innovative fatigue models accounting for coupled damage and plasticity effects for analysis of structures under high, medium and low cycling loads with the FEM. Applications to fatigue life prediction of metallic components and structures in the automotive industry and concrete structures in the building and construction sector. **PIs: L. Barbu and E. Oñate.**
- Modelling and simulation of the melting and burning of objects in fire. Applications to the analysis and design of fire retardant polymers. **PIs: J. Martí and E. Oñate.**

On-going RTD Projects

AVINT - Estratègies de mecanitzat i predicció de la rugositat per a una integritat superficial òptima

ACCIÓ - Comunitat RIS3CAT Industries del Futur

Coordinator: CTM - 01/01/2018 - 31/12/2020

ACASIAS - Advanced Concepts for Aero-Structures with Integrated Antennas and Sensors - EC - H2020

Coordinator: NLR - 01/06/2017 - 31/05/2020

ADaMANT - Marco Computacional para la Fabricación Aditiva de Componentes de Aleaciones de Titanio

MCIU - Proyectos de I+D (Excelencia)

Coordinator: CIMNE - 01/01/2018 - 31/12/2020

BIMIoTICa - Digitalización de los Procesos de Prevención de Riesgos Laborales en el Sector de la Construcción

Coordinator: MCIU - Retos Colaboración: Proyectos I+D 01/07/2018 - 31/12/2020

CALA - Seguridad hidrológica e incremento de la capacidad de embalse de presas de fábrica mediante la implementación de CAnales LAterales - MEIC - Retos

Colaboración: Proyectos I+D

Coordinator: CITECHSA - 01/09/2016 - 31/08/2019

COFRE - Compuerta Fusible REcuperable para la mejora de la Seguridad Hidrológica de las Presas

MCIU - Retos Colaboración: Proyectos I+D

Coordinator: Ventilación, estructuras y montaje metálicos, SL - 01/07/2018 - 30/06/2021

DRAGY - Drag Reduction in Turbulent Boundary Layer via Flow Control - EC - H2020 (2014-2020)

Coordinator: CIMNE - 01/04/2016 - 31/03/2019

Development of particle-based computational methods for predicting sand production and sand flow in oil wells. Exxon Mobil (Houston, USA)

PIs: M.A. Celigueta and E. Oñate - 2019-2021

Development of finite element methods for analysis and design of new polymer fiber reinforced rebars for the building and construction sector - Saudi Aramco.

PIs: X. Martinez and E. Oñate - 2019-2022

ECO-COMPASS - Ecological and Multifunctional Composites for Application in Aircraft Interior and Secondary Structures - EC - H2020 (2014-2020)

Coordinator: DLR - 01/04/2016 - 31/03/2019

EMUSIC - Efficient Manufacturing for Aerospace Components Using Additive Manufacturing, Net Shape HIP and Investment Casting - EC - H2020 (2014-2020)

Coordinator: Univ. Birmingham - 01/04/2016 - 31/03/2019

FIBRESHIP - Engineering, production and life-cycle management for massive application of FIBRE-based materials in large-length SHIPs

EC - H2020 (2014-2020)

Coordinator: TSI - 01/06/2017 - 31/05/2020

HAMELIN - Herramientas para adecuar y mejorar la gestión de plagas de insectos / Outils pour adapter et améliorer la gestion d'invasions d'insectes

EC - Interreg POCTEFA

Coordinator: CIMNE - 01/01/2019 - 31/01/2022

HIRMA - Desarrollo y validación de una aplicación para la determinación del hidrograma de rotura de presas de materiales sueltos

MEIC - Retos Colaboración: Proyectos I+D

Coordinator: INCLAM - 01/09/2016 - 31/08/2019

IMAGE - Innovative Methodologies and technologies for reducing Aircraft noise Generation and Emission

EC - H2020 - Coordinator: CHALMERS - 01/04/2016 - 30/06/2019

MATHEGRAM - Multiscale analysis of thermomechanical behaviour of granular materials

EC - H2020 (2014-2020) - Coordinator: USUR - UNIS 01/01/2019 - 31/12/2022

METACOUSTIC - Computational design and prototyping of acoustic metamaterials for target ambient noise reduction - EC - H2020 (2014-2020)

Coordinator: CIMNE - 01/11/2019-30/04/2021

METAMAT - Computational design of acoustic and mechanical metamaterials - MCIU - Proyectos de I+D

Coordinator: CIMNE - 01/01/2018 - 31/12/2020

Multiscale analysis of thermomechanical behaviour of granular materials

EC - MSCA-Marie Skłodowska-Curie Actions, H2020

PI: F. Zárte - 2019-2022

NICE-SHIP - Development of new Lagrangian computational methods for ice-ship interaction problems - ONR - NICOP

Coordinator: CIMNE - 30/09/2016 - 01/10/2019

PABLO - Prototipo de Aliviadero de BLOques en forma de cuña

MCIU - Retos Colaboración: Proyectos I+D

Coordinator: PREHORQUI - 01/07/2018- 30/06/2021

PRECISE - Métodos numéricos avanzados para el estudio de estructuras civiles frente a flujos de agua extremos Numerical methods for PREdicting the behaviour of Civil StructurEs under water natural hazards

MCIU - Retos Investigación: Proyectos de I+D+i

Coordinator: CIMNE - 01/01/2018 - 31/12/2020

PRO2 - Ecosistema d'R+D+i per la implementació i adopció de la Fabricació Additiva /Impressió 3D a fabricació de productes industrials i als processos industrials de producció

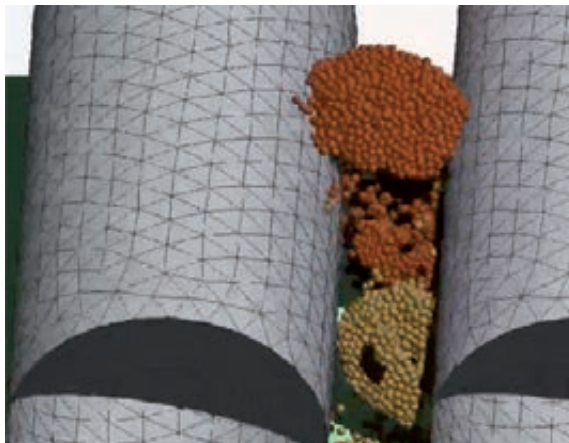
ACCIÓ - Comunitat RIS3CAT Llabor3D

Coordinator: LEITAT - 01/01/2018 - 31/12/2020

PS BRIDGE - Desarrollo de un puente liviano, modular y portable con vigas Tensairity

MCIU - Retos Colaboración: Proyectos I+D

Coordinator: PSTEC - 01/07/2018 - 30/06/2020



SCAVE - Espacio inmersivo, interactivo e itinerante para la gestión colaborativa de proyectos constructivos

MEIC - Retos Colaboración: Proyectos I+D

Coordinator: PMS - 01/10/2016 - 31/03/2019

SIMSOLIDAM - Simulation of metal Solidification in Additive Manufacturing processes

EC - H2020 (2014-2020)

Coordinator: CIMNE - 15/03/2017 - 14/03/2019

SMILER -Desarrollo de un Sistema basado en Machine Learning para la Reducción de pérdidas en redes de distribución de agua

MCIU - Retos Colaboración: Proyectos I+D

Coordinator: INCLAM - 01/07/2018 - 31/12/2020

StampackXXI - Desarrollo de un nuevo código para simulación de procesos de conformado de piezas laminares - MEIC- Retos Colaboración: Proyectos I+D

Coordinator: QUANTECH - 01/10/2016 - 31/03/2019

TRANSPORT - Ecosistema d'R+D+i per la implementació i adopció de la Fabricació Additiva/Impressió 3D a la indústria del transport

ACCIÓ - Comunitat RIS3CAT Llabor3D

Coordinator: CIMNE - 01/01/2018 - 31/12/2020

Staff

Eugenio Oñate (Leader)

Carlos Agelet de Saracibar

Diego E. Aguilera

Ferran Arrufat

Lucía Barbu

Gabriel Bugeda

Josep Maria Carbonell

Miguel Ángel Celigueta

Alejandro Cornejo

Ignasi de Pouplana

Daniel di Capua

Alessandro Franci

Joaquín González

José Manuel González

Mohammad Hashemi

Fernando Hermosilla

Sergio Jiménez

Joel Jurado

Salvador Latorre

Julio Martí

Xavier Martinez

Juan Miquel

Fernando Rastellini

Pavel Ryzhakov

Pablo L. Sierra

Francesc Turón

Ignacio Valero

Roland Wüchner

Francisco Zárte

Computational Design & Analysis of Engineering Metamaterials

The mission of the Computational Design & Analysis of Engineering Metamaterials group is the development of new computational tools for designing metamaterials with extreme acoustic, mechanical and electro-magnetic properties, focusing engineering applications.

Research

- **Acoustic Metamaterial Design:** design of optimal metamaterial acoustic attenuation metamaterial panels and liners based on engineered local resonance phenomena at the meso-scale.
- **Multiscale Modelling of Materials:** developing new methods and techniques to model the macroscopic behavior of materials accounting for their morphology, topology and arrangement at lower scales.
- **Reduced Order Computational Modelling:** developing specific methods to alleviate the huge computational cost inherent to multiscale simulations, by using Reduced-Order Modelling (ROM) and High performance reduced order modelling techniques (HPROM).
- **Topology Optimization:** developing new efficient techniques for topology optimization of the material at high and low scales.

Staff

Xavier Oliver (Leader)	Oriol Lloberas-Valls
Juan Carlos Cante	Marcelo Raschi
Manuel Caicedo	David Roca
Joaquín Hernández	

On-going RTD Projects

CATALOG - Computational catalog of multiscale materials: a plug-in library for industrial FE codes - EC - H2020 (2014-2020)

Coordinator: CIMNE - 01/01/2018 - 30/06/2019

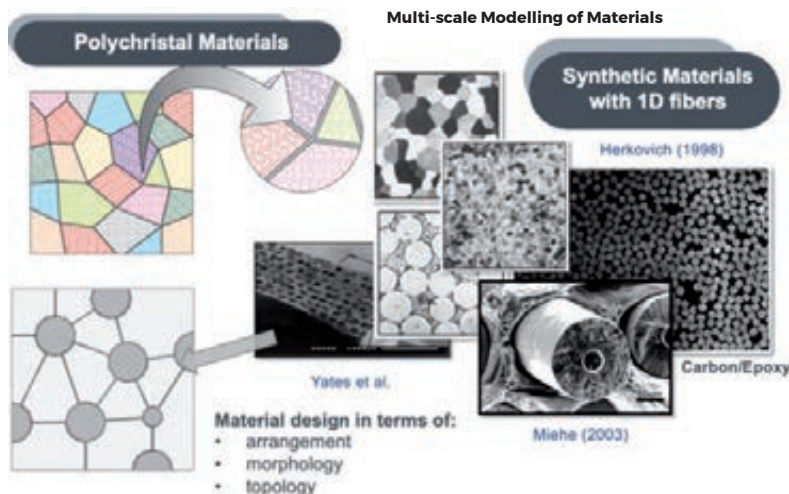
METACOUSTIC - Computational design and prototyping of acoustic metamaterials for target ambient noise reduction

EC - H2020 (2014-2020)

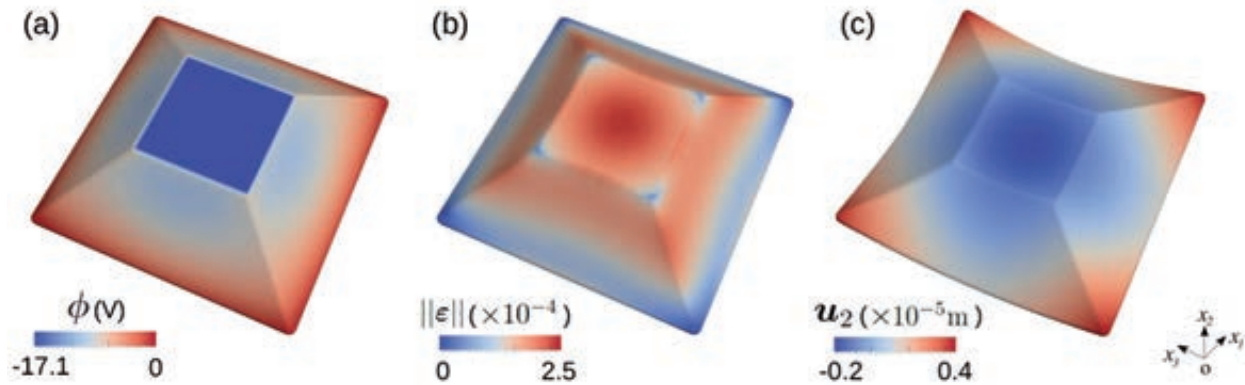
Coordinator: CIMNE - 01/11/2019-30/04/2021

METAMAT - Computational design of acoustic and mechanical metamaterials - MCIU - Proyectos de I+D

Coordinator: CIMNE - 01/01/2018 - 31/12/2020



Mechanics of Electroactive Materials



"Enabling flexoelectric engineering through modeling and computation (FlexoComp)", by Irene Arias. Lacàn.

This group will develop theoretical and computational models to quantify flexoelectricity in solids, focusing on continuum models but also exploring multiscale aspects, in tight collaboration with experiments.

We will explore the effects of strain gradients on the physics of dielectrics, identifying fundamental manifestations and identifying the underlying engineering principles for a new generation of electromechanical metamaterials.

Research

- Flexoelectric metamaterials. **PI: Irene Arias**
- Flexoelectricity effects in ferroelectrics. **PI: Irene Arias**
- Multiscale modeling of flexoelectricity. **PI: Irene Arias**
- Computational flexo-photovoltaics. **PI: Irene Arias**
- Flexoelectricity in soft materials. **PI: Irene Arias**

Staff

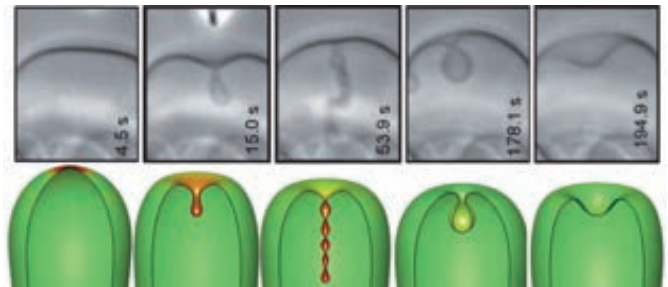
Irene Arias (Leader)

Soft and Living Material Interfaces

The group develops theoretical and computational models for the mechanobiology biological interfaces, cells and tissues, with the goal of quantitatively understanding these systems, rationally manipulating active living materials and engineering new bionic materials.

Research

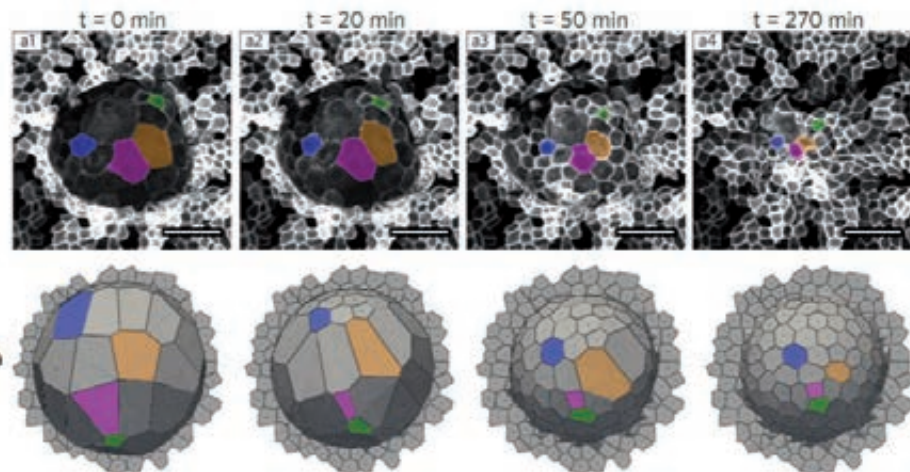
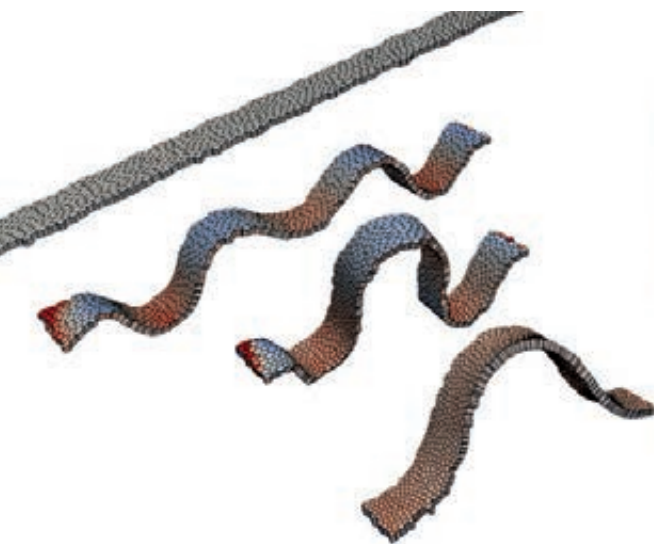
- **Mechanics of Epithelial materials:** Development of theoretical and computational models to understand and rationally manipulate epithelial materials in-vivo and in bio-hybrid devices. **PI: Marino Arroyo**
- **Mechanics of the cell envelope:** Development of theoretical and computational models to understand and quantify the mechanics of the cell envelope, and to develop biomimetic multifunctional systems based on the engineering principles of the cell envelope. **PI: Marino Arroyo**
- **Biomimetic shape-morphing interfaces:** Conceptualization, modelling and fabrication of shape-morphing surfaces inspired by biological morphing structures. **PI: Marino Arroyo**



- **High-performance finite element library for interfacial problems:** Development of a high-performance finite element parallel library to model Multiphysics interfacial problems. **PI: Marino Arroyo**
- **Analysis of cell and tissue dynamics:** Modelling of regulation of cell contractility and intercalation during morphogenesis. Development of specific finite element and vertex models. **PI: José Muñoz**

Staff

Marino Arroyo (Leader)
José Muñoz



Bio-Medical Engineering

The main objective of the group is to solve complex biomedical engineering problems by applying numerical models, machine learning techniques and virtual and augmented reality models.

The Biomedical Engineering (BME) group offers software solutions to automatically transform medical imaging to create a 3D digital twins of the patients to help diagnostics, to virtually try treatments, and to automatically design optimal braces and devices.

One of the main areas of activity of the BME group is the field of personalized cardiovascular devices. For medical companies and physicians who need to improve their personalized designs, BME brings innovative tools based on our numerical simulation technology to better design cardiovascular medical devices during the pre-prototype stage. We aim at making patient care more personalized and secure. The group has a strong background in the cardiovascular, dental and respiratory areas.

BME is developing Augmented & Virtual reality methodologies for improving the healthcare system. We are applying augmented reality techniques for breast and liver surgeries. We have developed an API to couple Unity and KRATOS frameworks. This API is able to provide augmented real simulations. The group has a clear practical approach, and includes among its capabilities the development of customized user medical interfaces.

Research

- Cardiovascular Research. **PI: E.Soudah**
- Medical Device R&D. **PIs: E.Soudah and J. A. Hernández**
- BIM & TIC Applications. **PI: E.Soudah**
- Augmented and Virtual Reality. **PI: E.Soudah**
- Respiratory System. **PI: E.Soudah**
- Image Processing & Modelling. **PI: E.Soudah**

On-going RTD Projects

ANACONDA - ANCD Brain®, micro-catéter de acceso distal para trombectomías cerebrales y tratamiento del accidente cerebrovascular isquémico agudo

MCIU - Proyectos de I+D

Coordinator: ANACONDA BIOMED S.L

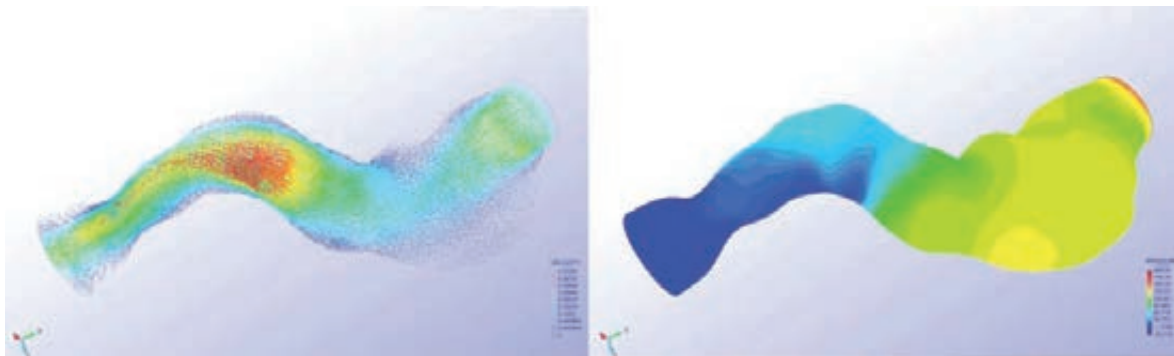
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Staff

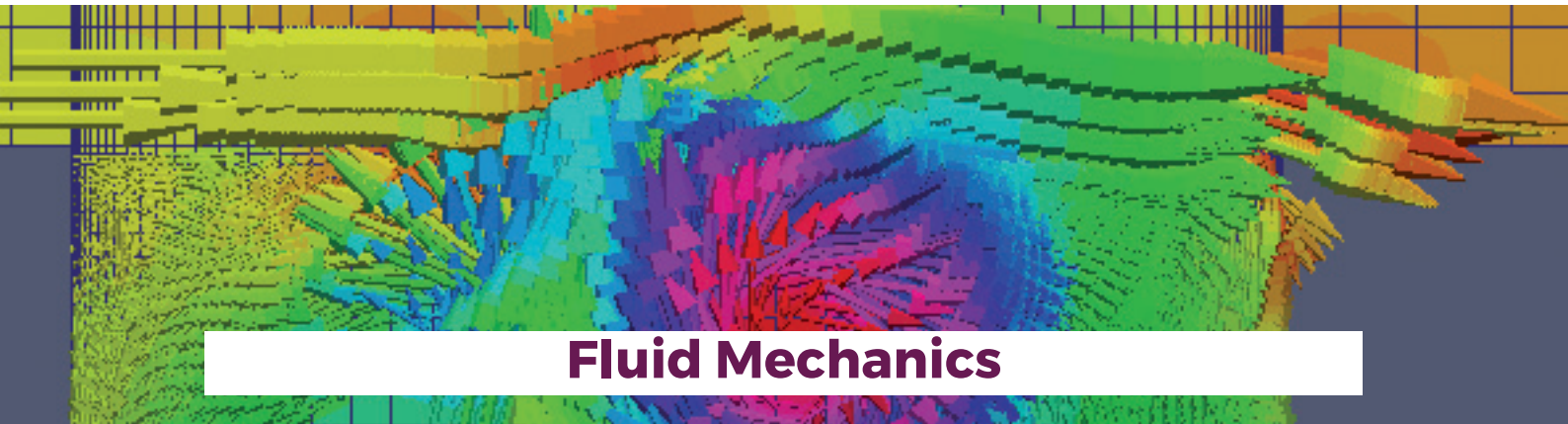
Eduardo Soudah (**Leader**)

Agustina Giuliodori

Joaquín A. Hernández



Coronary Analysis (Fractional Flow Reserve)



Fluid Mechanics

The Fluid Mechanics Group focuses on the development of mathematical models and numerical methods for the solution of a wide range of problems in engineering and other applied sciences involving external and internal flows.

Applications include, among others, high speed compressible flows, turbulent flows, shallow water flows, flow in porous media, aero-acoustics, wave propagation, viscoelastic fluids, bio-flows and many multidisciplinary coupled problems involving fluids, such as magneto-hydro-dynamics, fluid-structure interaction, and thermal flows.

From the point of view of the numerical techniques, the group works actively in areas such as stabilized finite element methods for flow problems, accurate and efficient time integration schemes (including fractional step methods), embedded mesh methods, reduced-order models, topology optimization, adaptive mesh refinement schemes and parallel computing.

Research

- Stabilized finite element methods for problems involving waves, viscoelastic flows, compressible flows, shallow water flows, magneto-hydro-dynamics and approximation of eigenvalues. **PI: R. Codina.**
- Efficient time integration schemes, including algebraic fractional step schemes for incompressible flows. **PI: R. Codina.**
- Meshless methods in CFD. **PIs: S. Idelsohn and E.Oñate.**

- Acoustic analogies in incompressible flows, direct numerical simulation of sound, aeroacoustics in time-dependent domains, application to human voice simulation. **PIs: R. Codina and J. Baiges.**
- Numerical simulation of turbulence, estimation of optical parameters of turbulent atmospheres, application to telescope visibility. **PI: R. Codina.**
- Reduced order models in fluid mechanics (ROM) **PIs: R. Codina and S. Idelsohn.**
- Topology optimization in fluid-structure interaction. **PIs: R. Codina and J. Baiges.**
- Domain decomposition, fluid-structure interaction, thermally coupled flows. **PIs: R. Codina and S. Idelsohn.**

On-going projects

TOP-FSI - Optimización topológica de estructuras sujetas a interacción fluido-estructura Topology Optimization of structures subject to fluid structure interaction
MCIU - Retos Investigación
Coordinator: CIMNE
01/01/2019 - 31/12/2021

Staff

Ramon Codina (Leader)
Joan Baiges
Sergio Idelsohn
Laura Moreno

Industrial Manufacturing Processes

The Industrial Manufacturing Processes Group was formed in 1998 at the International Centre for Numerical Methods in Engineering (CIMNE), Barcelona, Spain.

The Group was established for the development of computational tools for thermo-mechanical modeling and advanced non-linear analysis tools.

Research

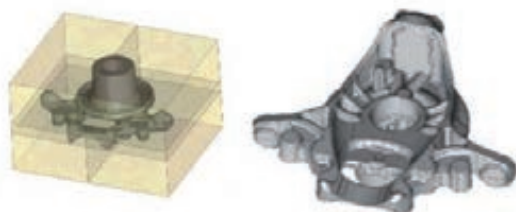
- Advanced Manufacturing Processes: Friction Stir Welding, Electron Beam Welding, Additive Manufacturing, Casting process, Metal Forming.
- Computational Failure Mechanics.
- Constitutive Modeling.
- Advanced thermo-mechanical algorithms.
- Advanced mixed finite element technology.
- Contact algorithms.

PIs: Miguel Cervera and Michele Chiumenti

On-going projects

ADaMANT - Marco Computacional para la Fabricación Aditiva de Componentes de Aleaciones de Titanio
MCIU - Proyectos de I+D (Excelencia)
Coordinator: CIMNE - 01/01/2018 - 31/12/2020

Add2Man - Design tool for optimal performance in Additive Manufacturing
EC - AGAUR - Valorització i transferència innovadora
Coordinator: CIMNE - 12/03/2020 - 11/09/2021



AVINT - Estratègies de mecanitzat i predicció de la rugositat per a una integritat superficial òptima (RIS-3CAT Industries del Futur)

ACCIÓ - Projectes col·laboratius recerca industrial i/o innovació

Coordinator: CTM - 01/01/2018 - 31/12/2020

FLOWCALOP - Flowforming Process Calibration Via Cloud Optimization

EC - H2020 - Coordinator: Industrias Puigjaner, SA
15/02/2019 - 15/02/2020

KYKLOS 4.0 - An Advanced Circular and Agile Manufacturing Ecosystem based on rapid reconfigurable manufacturing process and individualized consumer preferences - EC - H2020 - Coordinator: TECNALIA
01/01/2020 - 31/12/2023

LIGHT3D - Tecnologies de Làser i altra Llum (Agrupació BASE3D) - GENCAT - Agrupacions en tecnologies emergents 2018- Coordinator: Fundació CIM - 31/12/2019 - 31/12/2022

PRO2 - Ecosistema d'R+D+i per la implementació i adopció de la Fabricació Additiva /Impressió 3D a fabricació de productes industrials i als processos industrials de producció (Comunitat RIS3CAT Llabor3D)
Coordinator: LEITAT - 01/01/2018 - 31/12/2020

TRANSPORT - Ecosistema d'R+D+i per la implementació i adopció de la Fabricació Additiva/Impressió 3D a la indústria del transport (RIS3CAT Llabor3D)
ACCIÓ - Projectes col·laboratius recerca industrial i/o innovació
Coordinator: CIMNE - 01/01/2018 - 31/12/2020

Staff

Michele Chiumenti (Leader)
Miguel Cervera
Jesús Conde
Narges Dialami
Oscar Fruitós
Carlos A. Moreira
Ricard Sánchez



Information and Communication Technology

The Information and Communication Technology Group of CIMNE specializes in research, development and innovation of new and disruptive technologies, applicable to multiple engineering areas.

The group activities aim to improve simulation tools, smart embedded systems, Artificial Intelligence (AI) and GIS in order to develop Decision Support Systems (DSS) and prediction systems for advancing knowledge and technology in engineering and applied sciences.

Staff

Jordi Jiménez (Leader)

Pedro A. Arnau

Laura Almunia

Alberto Burgos

Alexis Cid

Sergi Macian

Andreu Marí

Javier Mora

José Luis Oñate

Gilbert Pfeffer

Ángel Diego Priegue

Javier Soraluze

Alberto Tena

Javier Tous

Sergio Valero

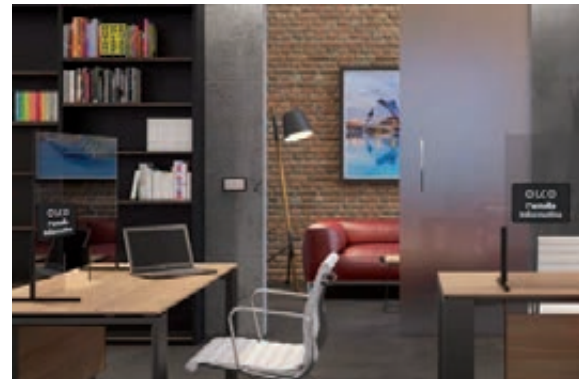
Claudio M. Zinggerling

Research

Computation and Information Technologies

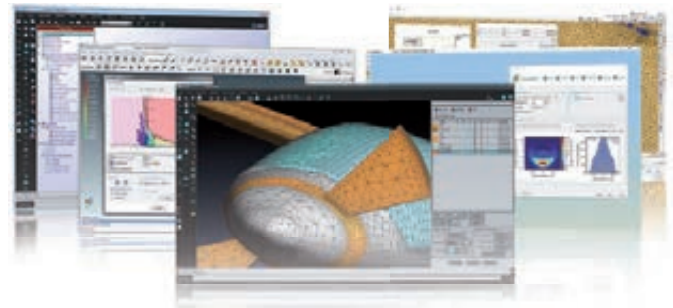
(PI: J. Jiménez)

- Decision Support Systems
- Smart Management Systems
- Internet of Things
- App Technology
- Embedded ICT Systems
- Internet Tools
- GIS (2D/3D)
- WSN Deployments
- BOT Technology
- Blockchain
- Machine Learning
- Virtual and Augmented Reality
- Data Science and Artificial Intelligence



Pre and Post-Processing

The Pre and Postprocessing Group works on the development of advanced methods for efficient generation of data for numerical simulations and visualization of computational results. This group holds the development team of the commercial pre and post-processing environment GID, which is a universal pre and post-processor for numerical simulations.



Research

- **Geometry creation, importation and edition. PI: Enrique Escolano**

Computational geometry for advanced CAD, CAE and CAM applications, considering the requirements from several fields such as numerical simulations, design or 3D printing.

- **Mesh Generation. PI: Abel Coll**

Robust and efficient meshing techniques for several simulations fields, such as electromagnetics, structural analysis, fluid dynamics and more.

- **Interfacing between preprocessor, solvers and postprocessor. PI: Javier Gárate**

Generation of semi-automatic interfaces between solvers and 3D environments able to assign all the needed information to the geometry and mesh to run calculations, and receive the solver data to visualize and post-process the results.

- **Visualization of a huge amount of data in a 3D environment. PI: Miguel Pasenau**

Specific techniques to post-process and visualize huge amounts of distributed data coming from solvers, specifically the ones running in HPC or cloud infrastructures.

- **Cloud software architectures for 3D simulation environments. PI: Adrià Melendo**

Development and deployment of cloud environments specifically adapted to work with 3D environments for numerical simulations.

On-going RTD Projects

ACASIAS - Advanced Concepts for Aero-Structures with Integrated Antennas and Sensors

EC - H2020 (2014-2020)

Coordinator: NLR

01/06/2017 - 31/05/2020

CityFlows - Decision-support system for pro-active crowd management of crowded urban spaces

EC - H2020 (2014-2020)

Coordinator: AMS Institute

01/01/2020 - 31/12/2020

Staff

Abel Coll (Leader)

Enrique Escolano

Javier Gárate

Adrià Melendo

Anna Monros

Miguel Pasenau

Valorization of Research and Technology Transfer

The Valorization of Research and Technology Transfer Group focuses on the development and implementation of innovative procedures for transforming the outputs of RTD activities of CIMNE into useful prototypes and products of practical interest and their subsequent transfer to industry.

Staff

Javier Marcipar (Leader)

The Valorization of Research and Technology Transfer group mission is to transfer technology in its broadest sense, by helping to identify and by putting together all the key players in the entire value chain of technology, from the creators to distributors in the market. Two main tools are used by CIMNE for the technology transfer: Technology License agreements and creation and shareholding in spin-offs.



Credible Data-driven Models

The group aims at developing, implementing and analyzing models and methods accounting for their credibility, and assimilating data into the model. The credibility concept embraces three underlying ideas: control of the numerical accuracy (Verification), monitor the pertinence of the model (Validation) and account for the aleatoric nature of the systems analyzed (Uncertainty Quantification).

The data assimilation strategies are incorporating into the models the information contained in data from sensors, observations and other models. This is complementary to the Validation phase (via parameter identification) and strongly related to the Uncertainty Quantification.

The group has a proven track record in applying these tools and methods to diverse disciplines in applied sciences and engineering. In particular, some of the current active projects and research lines pertain to the field of Automotive Engineering, Geophysical Modelling, and Biomechanics (biometamaterials).

Research

- **Error assessment and adaptivity.** Development, analysis and implementation of numerical tools for assessing the error in solutions produced by Finite Element and Reduced Order Models. Mesh and model adaptivity to monitor the numerical accuracy. **PI: P. Díez.**
- **Data-driven Geophysical Modeling.** High-fidelity models of large-scale geophysical phenomena in the earth crust. Data assimilation and model updating. Bayesian approaches to inverse problems. **PI: S. Zlotnik.**

- **Data-driven Biomechanical Modeling.** Modeling and simulation of biomechanical devices and bio-systems. Computational design of metamaterials for health care applications. **PI: A. García-González.**
- **Reduced-Order Models and Surrogate Models.** Intrusive and nonintrusive Reduced Order Models, using different numerical strategies accompanied by error control. Special insight in Proper Generalized Decomposition (PGD) and Proper Orthogonal Decomposition (POD). **PI: P. Díez.**
- **Explicit parametric solvers for NVH assessment.** Explicit parametric solutions for models assessing the NVH (Noise, Vibration and Harshness) behavior of automotive structures in the body-in-white phase. **PI: S. Zlotnik.**
- **Uncertainty Quantification for Crashworthiness.** Developing numerical strategies to assess the uncertainty of numerical output of crashworthiness simulations in automotive industry. **PI: A. García-González.**

On-going RTD Projects

ProTechTion - Industrial decision-making on complex production technologies supported by simulation-based engineering

EC - MSCA-Marie Skłodowska-Curie actions

Coordinator: CIMNE

01/03/2018 - 28/02/2022

Staff

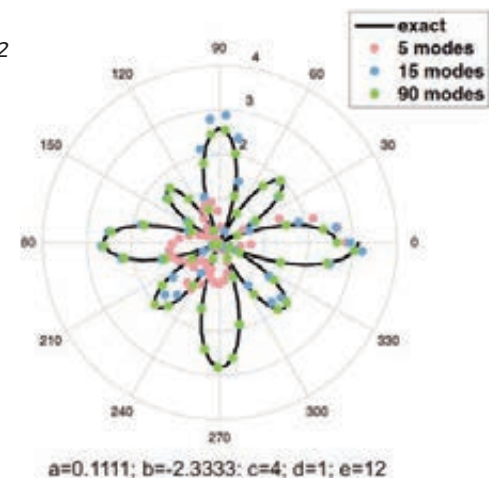
Pedro Díez (Leader)

Fabiola Cavaliere

Alberto García-González

Sergio Zlotnik

Figure from the paper “Encapsulated PGD Algebraic Toolbox Operating with High-Dimensional Data”



Innovative Algorithms for Fast Accurate Computing

Fast and accurate solution of computationally-demanding engineering problems is critical in daily industrial practice. Indeed, efficient strategies are needed to compute multiple queries of complex multi-physics and multi-disciplinary problems arising in parametric studies such as flow control, shape design and optimization, real-time monitoring of manufacturing processes and inverse analysis in medical imaging.

To contribute to these challenges the group exercises a comprehensive approach in the area of computational science and engineering, in order to develop new mathematical models and numerical methods to predict and quantify science and engineering problems. This implies combining concepts, methods and models of an interdisciplinary nature that include various disciplines such as mechanics, mathematics and computer science, among others.

Research

- **High-fidelity simulations of complex phenomena.** Development of high-order approximations (in particular, hybridizable discontinuous Galerkin) with exact geometric description (via NURBS-enhanced FEM) of engineering problems. **PIs: A. Huerta and M. Giacomini.**
- **Robust low-order solvers for large-scale problems.** Development of innovative finite volume strategies and integration in open-source libraries for fast computation of industrial problems. **PIs: A. Huerta and M. Giacomini.**
- **Reduced-order models for parametric studies.** Development of surrogate models (via proper generalized decomposition) for real-time solution of parametric problems. **PIs: A. Huerta and M. Giacomini.**

- **Credibility of computational engineering solutions.** Development of certification techniques for reliable simulations with goal-oriented error control and adaptivity. **PI: A. Huerta.**
- **Open-source solutions for industrial problems.** Development of open-source software and application to fluid, solid, electromagnetics and multi-physics problems of industrial interest. **PIs: A. Huerta and M. Giacomini.**

On-going projects

ProTechTion - Industrial decision-making on complex production technologies supported by simulation-based engineering

EC - MSCA-Marie Skłodowska-Curie actions

Coordinator: CIMNE

01/03/2018 - 28/02/2022

Staff

Antonio Huerta (**Leader**)

Matteo Giacomini



Kratos Multiphysics

The Kratos Multiphysics group aims at the development of a global purpose research code integrating state-of-the art capabilities in multiple fields, with the explicit goal of allowing the simulation of complex multi-physics problems.

The group aims at the exploitation of High Performance Computing capabilities to be employed for the simulation of realistic engineering problems. This goal will be achieved both by the development of new solution technologies and by exploring the integration of models from different areas, thus making the research intrinsically transversal.

The research will foster open source developments and collaboration with groups located at different locations and working in different areas. It will also contribute to the integration of different technologies within a single, unified, workflow with the goal of enriching the solution capabilities of the Kratos framework.

Research

- Innovative Algorithms and HPC techniques.

PIs: Riccardo Rossi and Santiago Badia

On-going projects

AMADEUS - Advanced Multi-sCALE moDEling of coupled mass transport for improving water management in fUel cells

MCIU - Proyectos de I+D: Generación de Conocimiento

Coordinator: CIMNE

01/01/2019 - 31/12/2021

ExaQute - EXAscale Quantification of Uncertainties for Technology and Science Simulation

EC - H2020 (2014-2020)

Coordinator: CIMNE

01/06/2018 - 31/05/2021

HIRMA - Desarrollo y validación de una aplicación para la determinación del hidrograma de rotura de presas de materiales sueltos

MEIC - Retos Colaboración: Proyectos I+D

Coordinator: INCLAM - 01/09/2016 - 31/08/2019

PRECISE- Métodos numéricos avanzados para el estudio de estructuras civiles frente a flujos de agua extremos Numerical methods for PREdicting the behaviour of Civil StructurEs under water natural hazards

MCIU - Retos Investigación: Proyectos de I+D+i

Coordinator: CIMNE

01/01/2018 - 31/12/2020

Staff

Riccardo Rossi (Leader)

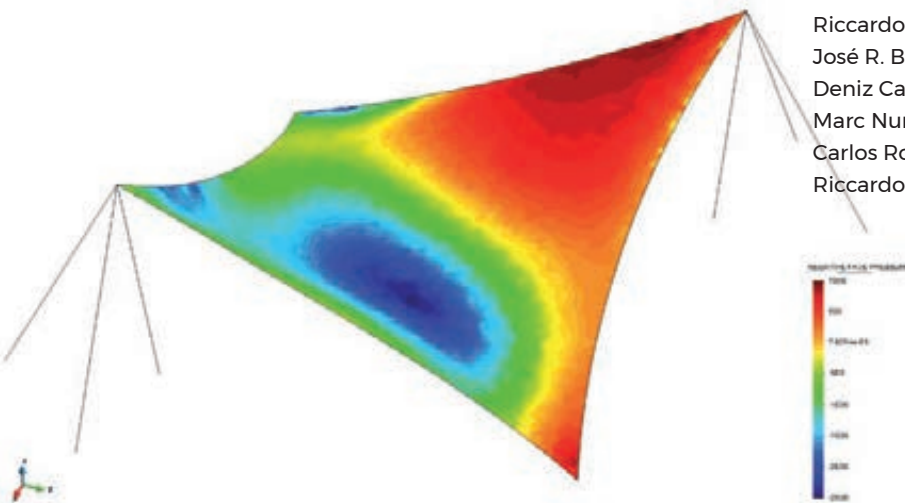
José R. Bravo

Deniz Cagri

Marc Nuñez

Carlos Roig

Riccardo Tosi



Large-scale Scientific Computing

The large scale scientific computing group develops advanced numerical methods for the simulation of problems governed by PDES, e.g., solid and fluid mechanics and electromagnetics, together with the design and implementation of scalable solvers for the arising linear systems.

Research topics

- **Uncertainty quantification and inverse problems.** Development of large scale workflows for multilevel Monte Carlo algorithms; design of embedded Multilevel Monte Carlo methods for stochastic domain simulations.

PIs: J. Hampton, J. Principe.

- **Inverse problems.** Design of large scale inverse solvers for saline wedge simulations; adaptive goal-oriented solvers for measurement error reduction; novel adaptive parameter spaces. **PIs:** D. García, S. Badia.

- **Unfitted finite element discretisations.** Aggregated finite element methods; high order unfitted schemes; aggregated mixed finite elements; applications in computational solid and fluid mechanics. **PIs:** F. Verdugo, M. Caicedo, S. Badia.

- **Mixed finite element methods for fusion.** Mixed finite element methods for inductionless magnetohydrodynamics; application to the simulation of breeding blankets in fusion reactors. **PIs:** J. Bonilla, S. Badia.

- **Novel abstractions in finite element software.** Lazy and immutable implementation of finite element methods; Julia-based implementation of finite element codes. **PIs:** F. Verdugo, V. Sande, S. Badia.

On-going RTD Projects

SOFAST - Marco de optimización estocástica para el diseño estructural de aeronaves A Stochastic Optimization Framework for Aircraft STructural design

MCIU - Retos Investigación

Coordinator: CIMNE

01/01/2019 - 31/12/2021

CompMam (Europ.Ex) - Towards Computational Methods for Metal Additive Manufacturing

MCIU - Acciones de Dinamización «Europa Excelencia»

Coordinator: CIMNE

01/12/2018 - 31/12/2020

Staff

Santiago Badia (**Leader**)

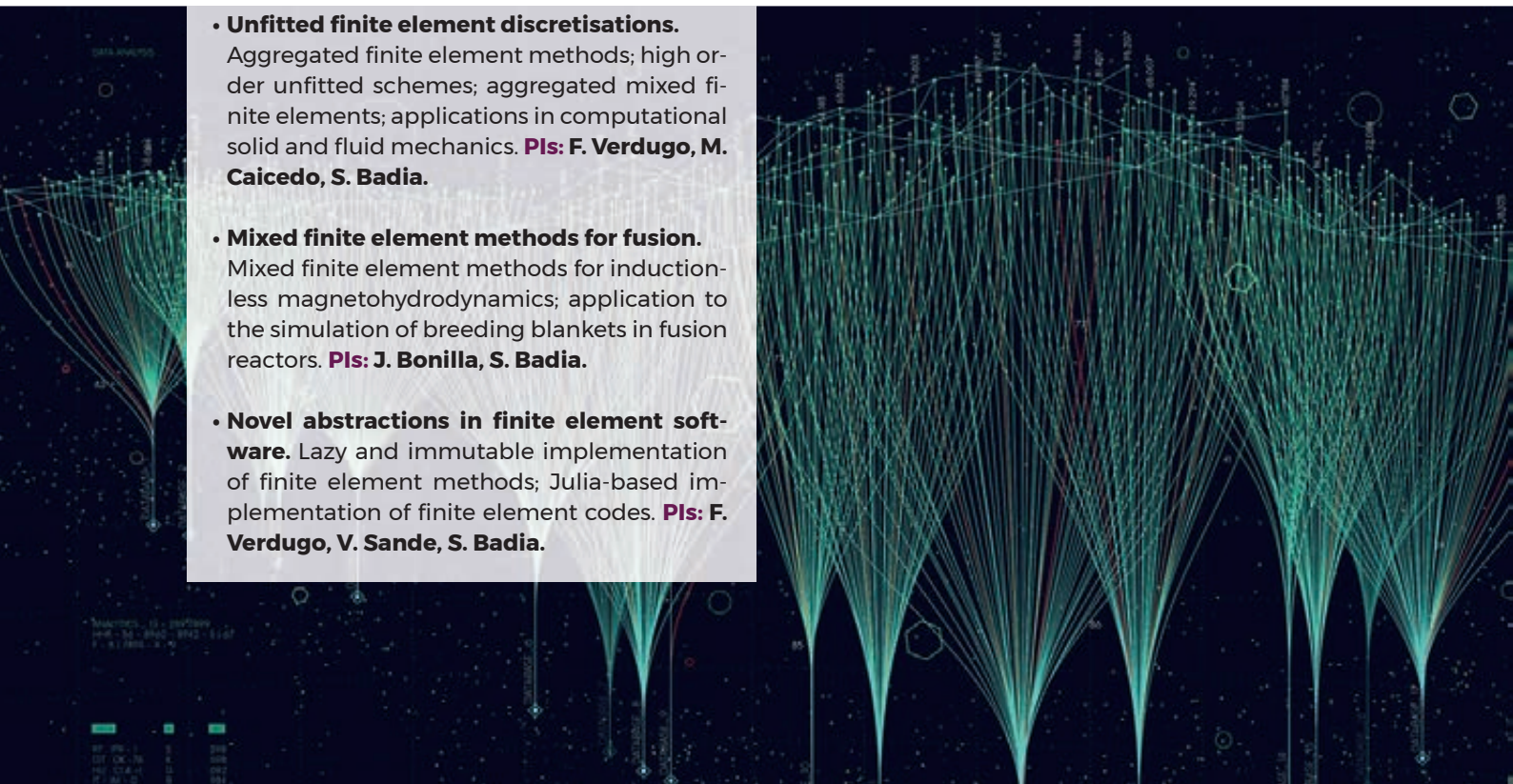
Jesús Bonilla

Jerrad Harris Hampton

Eric Miranda

Javier Príncipe

Francesc Verdugo



Aeronautics

The Aerospace Engineering Group develops innovative research in the fields of aeronautics and space, optimization and data modelling, as well as fuel cells.

The group deals with research in fluid dynamics, optimization, and fuel cells technology and also collaborates with other CIMNE groups in composites materials analysis and IT technology applied to sensing and data management.

Research

- **FEM and meshless methods for aerodynamics analysis and drag reduction in aeronautics.** This research line is oriented to develop, implement and apply meshless methods in aeronautical and engineering applications. **PIs: J. Pons-Prats and E. Ortega**
- **Optimization algorithms for robust optimal design, shape optimization and material design in aeronautics.** This research line is oriented to develop, implement and apply meshless methods in aeronautical and engineering applications. **PIs: G. Bugeda and J. Pons-Prats**

Staff

Jordi Pons-Prats (Leader)
Martí Coma
Roberto M. Flores
Enrique Ortega
Jacques Périaux

On-going RTD Projects

AVINT - Estratègies de mecanitzat i predicció de la rugositat per a una integritat superficial òptima
ACCIO - RIS3CAT - Coordinator: CTM
01/07/2017 - 30/06/2020

DRAGY - Drag Reduction in Turbulent Boundary Layer via Flow Control
EC - H2020 (2014-2020) - Coordinator: CIMNE
01/04/2016 - 31/03/2019

ExaQute - EXAscale Quantification of Uncertainties for Technology and Science Simulation
EC - H2020 (2014-2020) - Coordinator: CIMNE
01/06/2018 - 31/03/2019

ECO-COMPASS - Ecological and Multifunctional Composites for Application in Aircraft Interior and Secondary Structures
EC - H2020 (2014-2020) - Coordinator: DLR
01/04/2016 - 31/03/2019

FIBRESHIP - Engineering, production and life-cycle management for massive application of FIBRE-based materials in large-length SHIPs
EC - H2020 (2014-2020)
Coordinator: TSI - 01/06/2017 - 31/05/2020

GAVIUS - Gavius: from reactive to proactive public administrations
EC - 4th Call for Proposals (2019)
Coordinator: Ajuntament de Gavà
01/09/2019 - 31/08/2022

ICARE - International Cooperation in Aviation Research - EC-H2020 (2014-2020)
Coordinator: ERDYN - 01/10/2017 - 31/3/2020

IMAGE - Innovative Methodologies and technologies for reducing Aircraft noise Generation and Emission
EC - H2020 (2014-2020) - Coordinator: Chalmers
01/04/2016 - 31/03/2019

CENIT- Innovation in Multimodal Transport

With the integration of CENIT in CIMNE in 2017, synergies in research, development and technology transfer on the transport field have been enhanced.

URBAN MOBILITY. PI: Sergi Saurí

- Public Transport
- Travel Behavior
- Transport Economics
- Urban Freight Distribution
- Electromobility and Traffic Modelling

PORT LOGISTICS AND MARITIME TRANSPORT.

PI: Sergi Saurí

- Demand Analysis
- Transport Economics
- Operational Research at Terminals Port Management
- Port Management

TRANSPORT INFRASTRUCTURE MANAGEMENT.

PI: Sergi Saurí

- Transport Economics Public
- Private partnership

On-going RTD Projects

EnerNETMob - Mediterranean Interregional Electromobility Networks for intermodal and interurban low carbon transport systems

EC - MED Programme 2014-2020

Coordinator: REGPEL – 01/02/2018 - 31/01/2022

GrowSmarter - GrowSmarter: transforming cities for a smart, sustainable Europe (TRA.14P024)

EC - H2020 (2014-2020)

Coordinator: STOCKHOLMS STAD

01/01/2015 - 31/12/2019

INTERMODEL - Simulation using Building Information Modeling Methodology of Multimodal, Multipurpose and Multiproduct Freight Railway Terminals Infrastructures (TRA.16P042)

EC - H2020 (2014-2020)

Coordinator: IDP Ingeniería y Arquitectura Iberia SL

01/09/2016 - 31/08/2019

LASH FIRE - Legislation Assessment addressing Safety Hazards of Fire and Innovations in Ro-ro ship Environments – EC - H2020 (2014-2020)

Coordinator: RISE – 01/05/2019 - 30/04/2023

REG4SSEA - Estrategias regulatorias para fomentar el transporte sostenible a través del Short Sea Shipping Regulation strategies to promote sustainable transport through Short Sea Shipping

MINECO - Retos Investigación: Proyectos de I+D+i

Coordinator: CIMNE

01/01/2015 - 31/12/2019

Staff

Sergi Saurí (Leader)

Pere Arrom

Esther Blanco

Felipe Camprodon

Cloe Cortés

Irene de Cubas

Eglantina Dani

Javier Garrido

Francesc Gasparín

Genís Majoral

África Marrero

Moisés Ortega

Domingo Peñalver

Francisco Rodero

Naval and Marine Engineering

CIMNE has a large experience in conducting RTD projects in naval and marine engineering.

The main activities of the Naval and Marine Eng. Group are related to the development and application of computational methods and computer aided design and verification tools on the following topics:

- Hydrodynamic and seakeeping analysis of vessels and marine structures
- Hydro-elasticity and fatigue analysis in large marine structures
- Navigation in ice (ice-structure interaction)
- Environmental problems in marine and ocean engineering
- Near-time simulation (operational) tools for ocean wave converters
- Design and assessment of offshore wind turbines and ocean energy converters
- Optimization and design support systems in naval architecture and ocean engineering

Research

- Semi-Lagrangian methods for hydrodynamic analysis of ships and marine structures.

PIs: B. Serván and J. García

- Optimal design of ship hulls, wind energy structures and offshore structures. **PI: J. García**

On-going RTD Projects

FIBRESHIP - Engineering, production and life-cycle management for massive application of FIBRE-based materials in large-length SHIPs

EC - H2020 (2014-2020)

Coordinator: TSI - 01/06/2017 - 31/05/2020

NICE-SHIP - Development of new Lagrangian computational methods for ice-ship interaction problems

ONR - NICOP

Coordinator: CIMNE - 30/09/2016 - 01/10/2019

STM Validation Project

INEA - CEF Programme 2014-2020

Coordinator: Swedish Maritime Administration
01/01/2015 - 30/06/2019

Staff

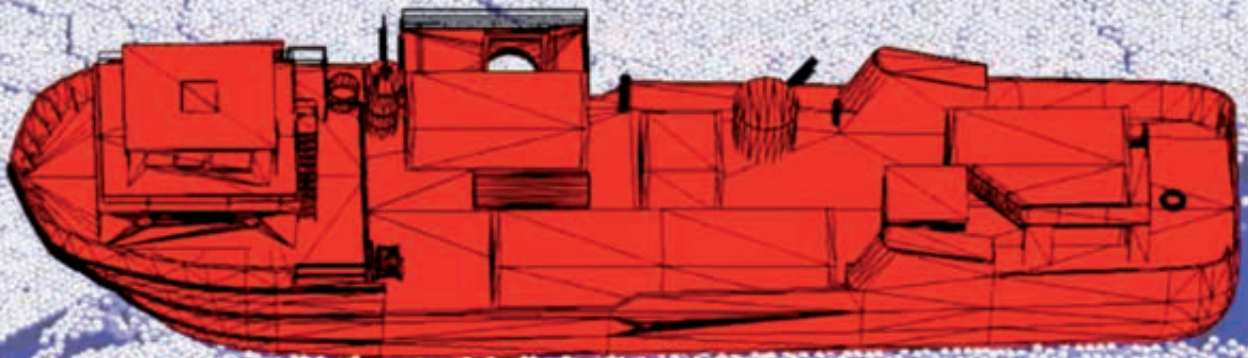
Julio García (**Leader**)

Jesús Carbajosa

Jonathan Colom

Rafael Pacheco

Borja Serván



Research Rankings

Webometrics Ranking

Recently, the **14th edition of Webometrics Ranking of Spanish researchers** and researchers working in Spanish Institutions (Spain) according to their Google Scholar Citations public profiles (<http://www.webometrics.info>) has been published.

This edition's data was collected during the second week of February 2020. The list includes the top **72.000 profiles ranked by h-index** in decreasing order and then by the total number of citations.

Eugenio Oñate, professor of the School of Civil Engineering of UPC, is in the position 307th of the ranking with an h-index of h=72 and 23.485 citations.

There are **98 CIMNE researchers listed in Webometrics, three of them among the 1.000 first positions:**

- Prof. Eugenio Oñate (307th position)
- Prof. Antonio Gens (446th position)
- Prof. Eduardo Alonso (825th position)

This list ranks Prof. Eugenio Oñate, director of CIMNE, as the highest cited researcher of Universitat Politècnica de Catalunya · BarcelonaTech (UPC).

Webcindario Ranking

Another reference website in research ranking is Webcindario (<https://indice-h.webcindario.com>). In March 2019, it updated its yearly list about prizes, women researchers and its ranking list by provinces.

The following list is a summary of the CIMNE researchers that appear in the one made by DIH Group / Webcindario:

Researcher Name (h (ISI/DIH) index); Knowledge area:

- **Oñate, Eugenio (1,5)**; Mathematics, Interdisciplinary Applications (Ranked N°1 in this field)
- **Gens, Antonio (1,33)**; Engineering, Geological
- **Huerta, Antonio (1,11)**; Mathematics, Interdisciplinary Applications
- **Alonso, Eduardo (1,03)**; Engineering, Geological
- **Idelsohn, Sergio (1,07)**; Mathematics, Interdisciplinary Applications
- **Oller, Sergio (1,01)**; Mathematics, Interdisciplinary Applications; Mechanics; Engineering, Multidisciplinary
- **Barbat, Alex H. (.92)**; Engineering, Civil
- **Arroyo, Marino (.91)**; Mathematics, Interdisciplinary Applications; Mechanics
- **Agelet de Saracibar, Carlos (.8)**; Engineering, Multidisciplinary



RANKING OF CIMNE SCIENTISTS IN SPAIN

RANK	RESEARCHER	H-INDEX	CITATIONS	RANK	RESEARCHER	H-INDEX	CITATIONS
307	Eugenio Oñate	72	23485	33404	Francesc Verdugo	9	244
446	Antonio Gens	66	19143	34336	Jerrad Hampton	8	494
825	Eduardo Alonso	57	16429	35185	Antonio R Marí	8	273
1172	Antonio Huerta	52	10497	35632	Eduardo Soudah	8	240
1410	Ramón Codina	49	9457	35909	Enrique Ortega	8	222
1506	Sergio Idelsohn	48	9813	35978	Alessandro Franci	8	218
1556	Miguel Cervera	48	6992	36479	Ernesto Castillo	8	189
1589	Xavier Oliver	47	12160	37654	Pooyan Dadvand	7	338
2024	Alex H Barbat	44	7349	37710	Fernando Rastellini	7	318
2464	Sergio Oller	41	8230	37812	Enrique Escolano	7	295
3316	Marino Arroyo	37	4879	40452	Jordi Pons Prats	7	124
3703	Julio García Espinosa	35	5929	40765	Jackson Tellez Álvarez	7	105
3704	Enrique Romero	35	5905	40892	Hieu Nguyen	7	87
4006	Sebastià Olivella	34	5380	41293	Manuel Alejandro Caicedo	6	271
4484	Alfredo Huespe	33	3490	41712	Fermín Otero	6	197
5270	Michele Chiumenti	31	3060	42753	Stoyan Danov	6	138
5663	Santiago Badia	30	3110	43030	Prashanth Nadukandi	6	129
7267	Carlos Agelet de Saracibar	27	2258	43589	Lucía Gratiela Barbu	6	113
8008	Melba Navarro	25	3741	44322	Alessandra di Mariano	6	93
8373	Pedro Díez	25	2083	50171	Oriol Colomés	4	118
8907	Riccardo Rossi	24	2163	50293	Joaquín Irazábal	4	108
10160	Antonio Rodríguez Ferran	22	2738	50333	Miquel Santasusana	4	105
10686	Xavier Martínez	22	1520	50361	Lorenzo Benedetti	4	103
10829	José Sarrate	22	1337	50935	David J Vicente	4	101
12836	Javier Príncipe	20	1212	51086	Ehsan Hajiesmaili	4	79
13181	M. Liliana Carreño	19	2089	51607	Emilio Salsi	4	75
13397	Luca Pelà	19	1565	51984	Alba Hierro	4	73
14763	Gabriel Bugeda	18	1275	52792	Eric Neiva	4	64
17762	Mabel Cristina Marulanda	16	929	52886	Adrià Melendo	4	58
19018	Juan Carlos Cante	15	975	52886	David Roca	4	48
19413	Francisco Zarate	15	822	55032	Marina Arbat Bofill	4	47
19555	Jaime Martí	15	776	55301	Ester Comellas	4	45
19726	Joan Baiges	15	712	55419	José Manuel González	3	113
25330	Pavel Ryzhakov	12	491	55766	Jordi Carbonell Morera	3	85
25505	Alberto F Martín	12	464	56401	Guillermo Casas	3	68
25876	Xue Zhang	12	398	57185	Jesús Bonilla	3	63
26554	Fernando Salazar	11	640	57686	Nelson Lafontaine	3	52
28714	Marcelo Raschi	10	700	57831	Claudio Zinggerling	3	41
28785	Oriol Lloberas Valls	10	630	58776	Ignasi de Pouplana	3	33
29307	Antonia Larese	10	449	59400	Marc Olm	3	29
29329	Rafael Morán	10	446	59400	Ilaria Iaconeta	3	28
29568	Francisco Javier Mora	10	407	59400	Barbara Llacay	3	22
31249	Miguel Ángel Celigueta	9	699	59400	Marcos Sanz	3	18
31326	Pedro Arnau	9	600	59400	Javier Marcipar	3	18
31531	Daniel Di Capua	9	466	68016	Daniel Pérez	1	5
32055	Borja Serván Camas	9	361	69149	Marcos Sanz Ramos	3	18
32671	Mario A Salgado Gálvez	9	298	69149	Arnab Samaddar Chaudhuri	1	3
33180	Jordi Cipriano	9	262				
33328	Roubin Emmanuel	9	249				

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Publications

CIMNE publishes books, journals, monographs, scientific reports and educational software on the theory and applications of numerical methods in engineering and applied science. The publications of CIMNE can be visited and ordered via Internet on the website cimne.com. Most publications can be freely downloaded from the web. We list below the publications of CIMNE in 2019.

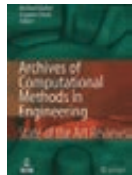
NUMBER OF CIMNE PUBLICATIONS (1987-2019)	
Edited books	86
Text books	46
Research reports	417
Technical reports	643
Monographs	271
Papers in journals (since 2009)	888

Books

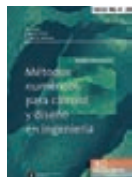
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In 2019 CIMNE researchers have published

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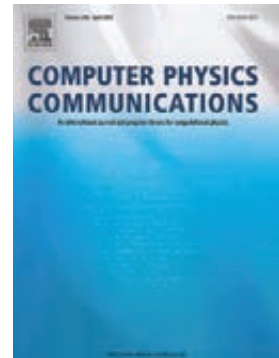
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CIMNE in Scipedia



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The published documents have a discussion forum where they can be commented by registered users. These comments contribute to the "popularity" of the document and increase the "prestige" of the author and of those who participate in the discussion.

CIMNE has its own institutional profile on Scipedia that consists of four sections: Overview, Publications, Members and Analytics.

This space is a repository of papers, monographs, technical reports and conference lectures given by CIMNE researchers. Here we can find here the magazine "Revista Internacional de Métodos Numéricos en Ingeniería", edited by CIMNE. To sum up, a comfortable site where is possible find all the scientific production of CIMNE and interact with its members.

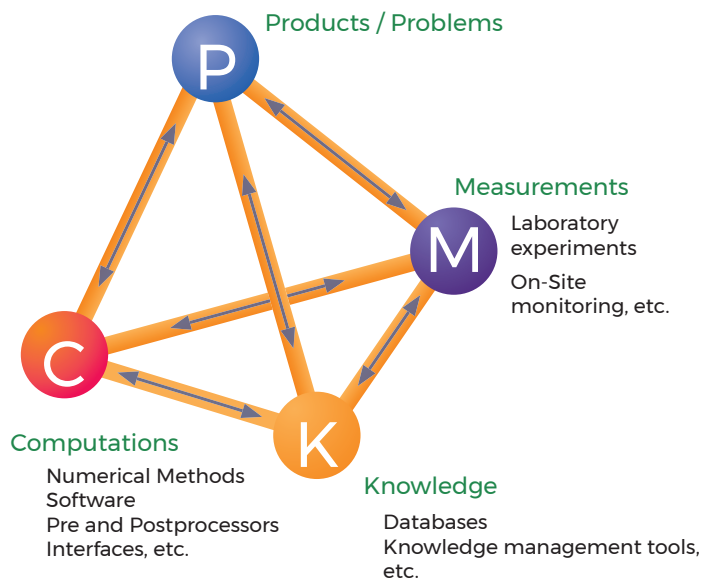
Innovation and technology transfer

CIMNE RTD activities are based on a holistic approach.

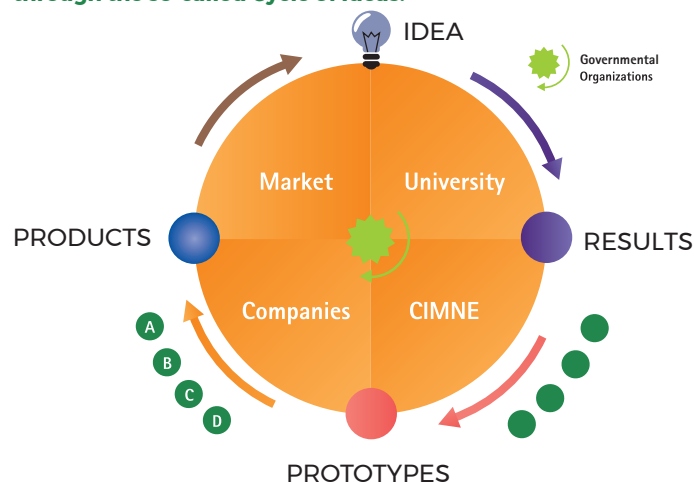
CIMNE aims at providing comprehensive solutions for solving problems that affect human beings, through the integration of existing knowledge in a particular field with quantitative information emanating for prediction methods, such as computational-based techniques, and experimental measurements.

These four concepts: the problem to be solved, computational methods, experimental methods and existing knowledge can be represented by the tetrahedron shown in the figure above. Each of the nodes is connected to the other three by lines that represent information transfer pipelines.

The holistic approach for solving problems at CIMNE:



The mission and activity of CIMNE can be explained through the so-called Cycle of Ideas:



Ideas (scientific advances) usually originate in university environments, where many professionals study, investigate and discover new areas of knowledge. The idea matures until it produces tangible results (thesis, papers, computer programs, physical devices, etc.) that have to be filed and protected. **Results** evolve until they reach the level of a prototype (a software code, a system, a device, etc.). The transit of a result to a prototype demands an organization, efficient and capable staff and resources. What it is desirable is that the idea follows its route on specialized institutions, adjacent to the university, such as CIMNE, with the mission of transforming knowledge into tangible things (prototypes). The **prototype** develops into a product within a company. The cycle follows with the marketing of the **product** and ends up with the reinvestment of part of the revenues in the development of new ideas.

CIMNE Products

PRE AND POST PROCESSING SOFTWARE

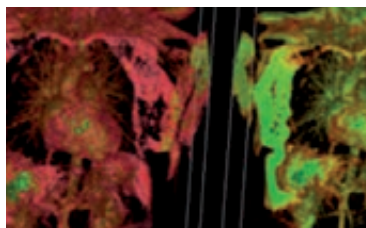
GID



A universal and adaptive pre and postprocessor for computer simulation in engineering and applied science.

Developed & marketed by CIMNE since 1998. www.gidhome.com

DIPPO



Versatile platform for digital image processing combined with numerical modelling and simulations.

Developed and marketed by CIMNE since 2011.

ENGINEERING SYSTEMS AND HARDWARE

INFLATABLE STRUCTURES



Inflatable pavilions, shelters and bridges for applications in engineering and architecture.

Developed by Buildair and CIMNE. Marketed by Buildair since 2002.

buildair.com

OKO



Software and hardware for the intelligent management of audiovisual content and digital signage.

Developed by CIMNE.

Marketed by OKTICS ATZ SL. okobusiness.com

WATER-PS



Fresh water production system.

Developed by CIMNE and Fresh Water Nature, Ltd.

Marketed by Fresh Water Nature, Ltd. since 2016.

freshwaturnature.com

COLLABORATIVE WORK PLATFORMS

MI COLEGIO EN RED



Communications system and integrated services designed specifically for schools via the Internet. Developed and marketed by CIMNE since 2000. ✦ cimne.com/mcr

FRAKTALIS



Fully customizable web application that creates virtual communities where users can communicate and share. Developed and marketed by CIMNE since 2009. ✦ fraktalis.com

EDUCATIONAL SOFTWARE



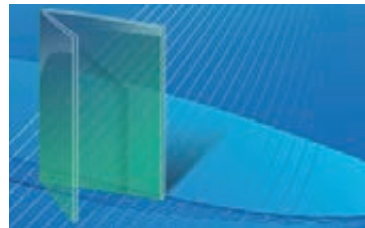
Educational software for interactive learning about structural design and finite element method. Developed and marketed by CIMNE. ✦ cimne.com/educational

LHINGS



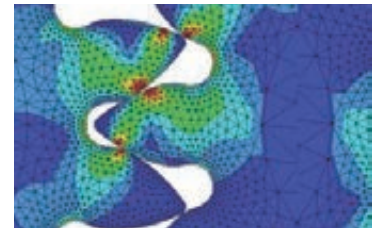
Cloud platform to provide access and links to all kind of things and let users manager, share and interact with them. Developed and marketed by Lyncos SL and CIMNE. ✦ lhings.com

SIGPRO



Integrated software platform for the management of the research and financial activities and reports in RTD projects. Developed by CIMNE. ✦ cimne.com/sigpro

MAT-FEM



Educational program in MATLAB for introduction to the finite element method for analysis of structures and field problems. Developed by CIMNE. ✦ cimne.com/mat-fem

SCIPEDIA



Web platform for free publishing and open access of scientific publications. Developed by Scipedia, S.L. in cooperation with CIMNE. Marketed by Scipedia, S.L. since 2016. ✦ scipedia.com

DECISION SUPPORT SYSTEMS

BEACHING



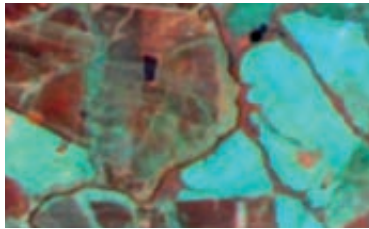
Information system for management of tourism activities in beach areas. Developed by CIMNE and marketed by TAOC SA since 2011. ✦ beaching.com

RMOP



Integrated platform for robust multiobjective optimization in engineering. Developed by CIMNE. ✦ tts.cimne.com/RMOP

DECISION SUPPORT SYSTEMS

GIS+

Web-based interactive Geographic Information System.
Developed by CIMNE.

SIE

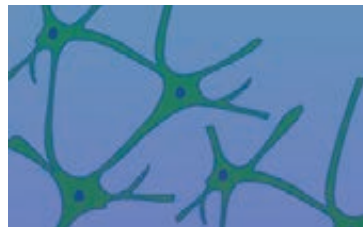
Information system for management of energy consumption in public buildings and municipalities. Developed by CIMNE. Marketed since 2005 by Gassó Auditores SL and CIMNE. inergybcn.com

ROEM

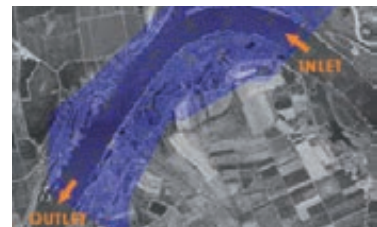
Information system for assessment of the environmental quality in reservoirs and lakes.
Developed by CIMNE.

E-TESTING

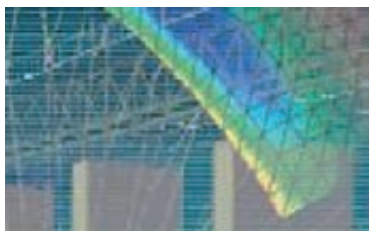
Web-based platform for e-management of experimental tests.
Developed by CIMNE and Applus.

FLOOD

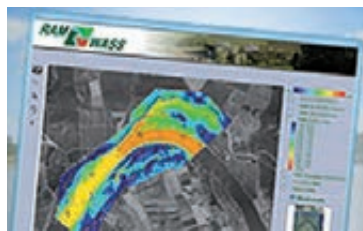
Artificial neuronal network package. Developed by CIMNE.
cimne.com/flood

RAMFLOOD

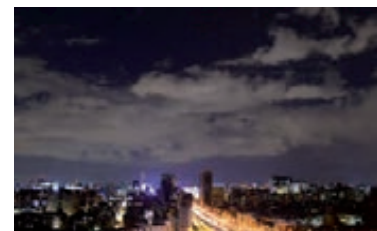
Decision support system for risk assessment and managing of floods.
Developed by CIMNE and Flumen.
www2.cimne.com/ramflood

WSNP

An integrated platform for e-monitoring using wireless sensor network technology.
Developed by CIMNE.
www2.cimne.com/wsnp

RAMWASS

Decision support tool for the risk assessment and management of environmental and human-induced hazards on the water/sediment/soil system in fluvial ecosystems. Developed by CIMNE.
www.cimne.com/ramwass

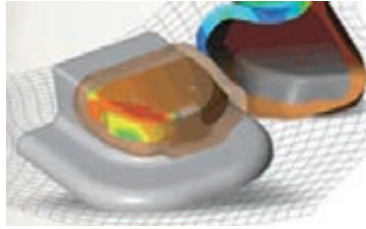
BEE DATA

Open source BiG Data Analytics platform for deep analysis of massive data coming from smart metering infrastructure of utility companies. Developed by CIMNE and marketed by Inergy.
beedataanalytics.com

SIMULATION SOFTWARE FOR INDUSTRIAL PROCESSES

WELDPACK

Welding processes software.
Developed by CIMNE.

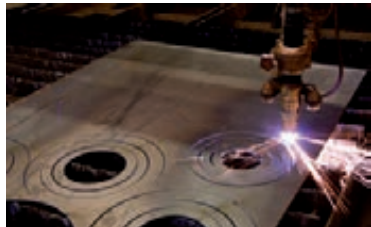
STAMPACK

Software for sheet metal forming processes. Developed by Quantech ATZ, SA and CIMNE. Marketed by Quantech ATZ, SA since 1999.

stampack.com

CLICK2CAST

Software for fast simulation of casting processes. Developed by Quantech ATZ in cooperation with CIMNE. Marketed by Altair since 2015.

SCUT

Software able to simulate cutting processes for the metal manufacturing industry. Developed by CIMNE.

ADD2MAN

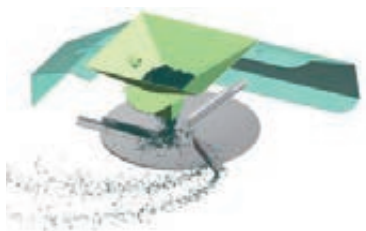
Additive manufacturing processes software. Developed by CIMNE in cooperation with Eurecat.

FORGEPACK

Forging manufacturing processes software. Developed by CIMNE.

MACHPACK

Software able to simulate machining manufacturing processes. Developed by CIMNE.

SPREADDEM

Simulation software for the study of the particle flow on centrifugal fertilizer spreaders. Developed and marketed by CIMNE.

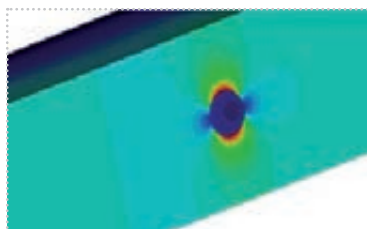
cimne.com/spreaddem

SIMULATION SOFTWARE FOR MULTIPHYSICS

KRATOS

Object-oriented software platform for the development and application of finite element codes for multidisciplinary applications. Developed by CIMNE.

✱ cimne.com/kratos

ERMES

Computational electromagnetics using advanced finite element methods.

Developed by CIMNE.

✱ tts.cimne.com/ermes

PFIRE

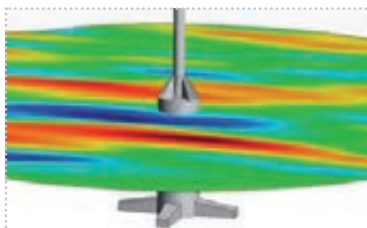
Analysis of propagation of fire and its effect on the burning and melting of objects.

Developed by CIMNE.

SIMULATION SOFTWARE FOR FLUID DYNAMICS

TDYN

Finite element code for analysis of a wide range of multi-physics problems in engineering and applied science. Developed by Compass Ingeniería y Sistemas, SA. and CIMNE. Marketed by Compass since 2003. ✱ compassis.com

SEAFEM

Hydrodynamics and seakeeping analysis of ships and marine structures. App for wind tower generators in the sea. Developed by Compass Ingeniería y Sistemas, SA. and CIMNE. Marketed by Compass since 2011. ✱ compassis.com

PFLOW

Analysis of fluid dynamics and fluid-structure-soil-thermal interaction problems into the Particle Finite Element Method (PFEM).

Developed by CIMNE.

✱ cimne.com/pfem

PARACHUTES

Computer program for the fast simulation of parachute-payload systems. Developed and marketed by CIMNE since 2016.

✱ cimne.com/parachutes

SIMULATION SOFTWARE FOR STRUCTURAL ENGINEERING

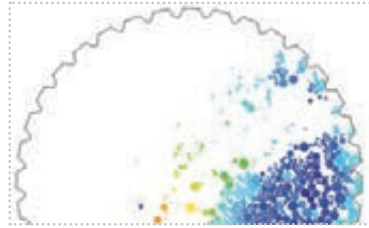
RAMSERIES



Finite element code for analysis of structures in engineering and architecture. Developed by Compass Ingeniería y Sistemas, SA. and CIMNE. Marketed by Compass since 2003.

✦ www.compassis.com

DEMPACK



Analysis of granular systems and multifracturing problems in geomechanics and industrial processes using discrete and finite element methods. Developed by CIMNE.

✦ cimne.com/dem

COMET



Finite element code for nonlinear analysis of thermomechanical problems in solid and structural mechanics accounting for frictional contact situations. Developed by CIMNE. ✦ cimne.com/comet

BIOMECHANICS & HEALTH

HEALTH APP



App to control eating disorders. Developed by HealthApp in cooperation with CIMNE. Marketed by HealthApp SL since 2014.

✦ bcnhealthapp.com

BODYGID



Multiscale representation and analysis of the human body. Developed by CIMNE.

✦ cimne.com/bodygid

VISIT CIMNE PRODUCTS AT
CIMNE.COM/PRODUCTS

Spin-off companies



SOLUCIONES INTEGRALES DE FORMACIÓN Y GESTIÓN STRUCTURALIA, SA

Created in 2001

* **structuralia.com**

Training and consulting activities in the civil engineering via Internet. It was sold in 2011 to KAPLAN (The Washington Post Group).



COMPASS INGENIERÍA Y SISTEMAS, SA

Created in 2002

* **compassis.com**

It develops commercial activities related to numerical methods in engineering, with emphasis on civil, naval and maritime engineering. CIMNE owns 24% of COMPASS.



QUANTECH ATZ

Created in 1996

* **quantech.es**

Development and marketing of simulation software for production processes.

CIMNE TECNOLOGÍA, SA

Created in 2011

* **cimnetecnologia.com**

Company 100% owned by CIMNE aiming to industrialize and market the products and technology developed at CIMNE. CIMNE Tecnología SA. is also an incubator and promoter of new companies.



BUILDAIR INGENIERÍA Y ARQUITECTURA, SA

Created in 2001

* **buildair.com**

Inflatable structures for engineering and architecture applications. CIMNE Tecnología SA owns 3,76% of Buildair.



BEEDATA ANALYTICS, SL

Created in 2017

* **beedataanalytics.com**

ICT services based on mass analytical data treatment to users and business intelligence for companies and institutions. CIMNE Tecnología owns 37,67% of Beedata Analytics, SL.



BIOMECHANIC DEVELOPMENTS, SL

Created in 2015

* **cimnetecnologia.com**

Software solutions and services in biomedical field. CIMNE Tecnología SA owns 43,67% of Biomechanics Developments.


**COMPUTATIONAL AND
INFORMATION TECHNOLOGIES, SA**

Created in 2012

✦ **citechsa.com**

Computational methods and information technology systems in engineering. 100% owned by CIMNE Tecnología SA.


FRESH WATER NATURE, SL

Created in 2013

✦ **freshwaturnature.com**

Solutions for obtaining fresh water from desalination and distillation of waste water.

The company is 92,99% owned by CIMNE Tecnología SA.


HEALTHAPP, SL

Created in 2013

✦ **bcnhealthapp.com**

Software for treatments of eating disorders. It improves the links therapist / patient.

18,52% owned by CIMNE Tecnología SA.


RSM GASSÓ CIMNE ENERGY, SL

Created in 2012

✦ **inergybcn.com**

Advanced engineering energy services. 50% owned by Servicios Energéticos Avanzados, SL, which is 100% owned by CIMNE Tecnología, SA.


INLOC ROBOTICS, SL

Created in 2014

✦ **inlocrobotics.com**

Positioning and navigation solutions for mobile robots in buried environments. CIMNE Tecnología owns 6,19% of INLOC Robotics since October 2015.


LYNCOS TECHNOLOGIES, SL

Created in 2012

✦ **lhings.com**

Software and systems for the Internet of Things.

CIMNE Tecnología SA owns 4,77% of Lyncos Technologies, SL.


**PORTABLE MULTIMEDIA
SOLUTIONS, SL**

Created in 2013

✦ **portablemultimediasolutions.com**

Mobile pavilions with multimedia technology for leisure, sport and events. 22,6% owned by CIMNE Tecnología SA.


**PNEUMATIC STRUCTURES
TECHNOLOGIES, SL**

Created in 2015

✦ **ps-technologies.com**

Pneumatic structures for a wide range of engineering problems.

9,5% owned by CIMNE Tecnología SA.


OKTICS ATZ, SL

Created in 2019

✦ **okobusiness.com**

Digital Signage Technologies and products.

CIMNE Tecnología, SA owns the 24,5% of OKTICS ATZ SA.


SCIPEDIA, SL

Created in 2015

✦ **scipedia.com**

Free publishing and open access for scientific publications. CIMNE Tecnología owns 16,67% of Scipedia, SL.



Alliances

CIMNE, leader in research on computational engineering, has established relevant alliances with international institutions and companies since its creation in 1987.



CIMNE host of UNESCO Chair of Numerical Methods in Engineering Since 1989.

Prof. Olgierd Zienkiewicz was UNESCO Chair until his death (2009).



Secretariat of SEMNI
Since 1989



Pilot Center of
ERCOFTAC in Spain
Since 1989



Secretariat of ECCOMAS
Since 1992



Secretariat of IACM
1994 - 2016



Partner of FLUMEN
Since 2012



Creation of AIAC
Since 2015

Unesco Chair in Numerical Methods in Engineering

UNESCO and UPC · BarcelonaTech reached an agreement to create the first UNESCO chair in the world in 1989: the UNESCO Chair of Numerical Methods in Engineering.



Dr. Jacques Périaux

The main mission of the Chair is to promote the development, dissemination and application of numerical methods in engineering at an international level, through education, research and technology transfer, with the aim of contributing to the solution of complex problems in lower-income countries.

Prof. O. C. Zienkiewicz held the UNESCO Chair since its creation in 1989 until his death on January 2nd, 2009. Since 2009 Dr. Jacques Périaux is the Chairholder of the Unesco Chair of Numerical Methods in Engineering. He is a recognized expert in the field of numerical methods applied to aerospace engineering.

Dr. Périaux contributions have resulted in a significant increase in the RTD activities of CIMNE in the aerospace sector, in particular with academic organizations and industry in China, the organization of numerous training courses, exchanges with leading scientists worldwide and several RTD projects at an international level.

It is important to note that computational methods are especially useful in resource-limited countries because they enhance the ability of people to predict outcomes and optimize solutions before committing resources to specific investments.

An important UNESCO Chair activity over the years has been the creation of a series of “Aulas CIMNE” (CIMNE Joint Labs), physical spaces of collaboration with other research groups in universities and research centers located mainly in Latin America and Europe. All nodes in the network connected to each other are using, transforming and broadcasting knowledge generated in CIMNE over the last thirty years.

Both the people and the knowledge generated by the network members easily circulate within the network. “Aulas CIMNE” is now a growing network of centers of excellence in research and training in the field of numerical methods.

A priority in the network is the promotion of joint projects in research and training using international competitive funds and existing programs that target specific local needs. Links with scientific groups and other organizations established locally are also actively encouraged. The network is the seed for creating other expected nodes in countries of Africa and Asia.

Dr. Cecilia Soriano is the coordinator of the UNESCO Chair of Numerical Methods in Engineering.



FLUMEN Institute



In 2012, the Government of Catalunya created the FLUMEN Institute for River Dynamics and Hydrologic Engineering as a partnership between CIMNE and UPC · BarcelonaTech.

FLUMEN Institute is the outcome of merging the prestigious Flumen RTD group existing since 2005 at the School of Civil Engineering of UPC · BarcelonaTech and CIMNE, bringing together the numerical and experimental expertise of Flumen RTD group in hydraulics with the broad experience of CIMNE on numerical methods, computer simulation and integration of decision support systems.

The objectives of FLUMEN are the promotion of RTD and technology transfer activities in the field of river dynamics and hydrologic engineering. The Flumen Institute is directed by Prof. Ernest Bladé.

FLUMEN Premises



Flumen Institute is located at the B0 Building in the North Campus of UPC · BarcelonaTech since 2016. The building is equipped with modern experimental facilities for model scale testing of river dynamic and hydraulic problems. It also provides work areas for researchers at the graduate level (masters, doctoral and postdoc) and for senior researchers from CIMNE and UPC · BarcelonaTech.

Flumen is actively engaged in research activities, consulting, training and technology transference in relation to hydrology and river dynamics.

★ www.flumen.upc.edu



CIMNE^R

UNIVERSITAT POLITÈCNICA
DE CATALUNYA
UPC
BARCELONATECH



Unió Europea
Fons europeu
de desenvolupament regional
Una manera de fer Europa

SEMNI

Sociedad Española de Métodos Numéricos en Ingeniería

Since 1989 CIMNE supports the activities of the Spanish Association for Numerical Methods in Engineering (SEMNI).

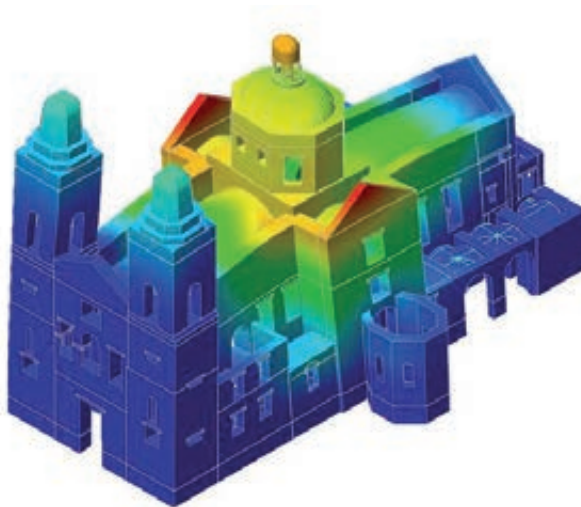
SEMNI

The basic aims of SEMNI are the organization and coordination of all activities related to numerical methods in engineering in Spain and being the Spanish representative in the International Association for Computational Mechanics (IACM).

SEMNI is linked to similar associations in other countries, such as the European Community on Computational Methods in Applied Sciences (ECCOMAS), the International Association for Computational Mechanics (IACM), the Groupe pour l'Avancement des Méthodes Numériques de l'Ingénieur in France, the United States Association for Computational Mechanics in the United States, and the Asociación Argentina de Mécanica Computacional, among others.

The headquarters and the secretariat of SEMNI are based in CIMNE. Currently, SEMNI has over 400 members worldwide. Some of the main activities of SEMNI include the organization of technical workshops and the organization of the Spanish Conference on Numerical Methods in Engineering, held every two years.

SEMNI will organize, jointly with the Portuguese association APMTAC, the congress CMN 2019 (Congress on Numerical Methods in Engineering) on July 1-3, 2019, in the city of Guimarães (Portugal). During the event, the Prize SEMNI Olgierd Zienkiewicz will be awarded to Manuel Doblaré and the Prize SEMNI Juan Carlos Simó will be awarded to Joan Baiges. The best theses of the year will also be awarded.





European Community on Computational Methods in Applied Sciences

ECCOMAS is a scientific organization founded in 1992. It groups European associations with interests in the development and application of computational methods in applied sciences and technology. The ECCOMAS Secretariat is located at CIMNE.



The mission of ECCOMAS is to promote joint efforts of European universities, research institutes and industries which are active in the broad field of numerical methods and computer simulation in Engineering and Applied Sciences (i.e. Computational Solid and Structural Mechanics, Fluid Dynamics, Acoustics, Electromagnetics, Physics, Chemistry, Applied Mathematics, and Scientific Computing), to address critical societal and technological issues with particular emphasis on multidisciplinary applications and disseminate innovative research.

The three main scientific events that ECCOMAS organizes every four years are the ECCOMAS Congress, the ECCOMAS Conference on Computational Solid and Structural Mechanics (ECCM) and the ECCOMAS Conference on Computational Fluid Dynamics (ECFD). They attract approximately 5,000 participants in total.

The ECCOMAS Congress is addressed to scientists and engineers both in and outside Europe. Its main

objective is to provide a forum for presentation and discussion of state-of-the-art in scientific computing applied to engineering, with emphasis on basic methodologies, scientific development and industrial applications. It also includes invited lectures, Special Technological Sessions (STS), contributed papers from Academy and Industry and organized Minisymposia. Proceedings of the ECCOMAS Congresses are widely disseminated in Europe.

The next 14th World Congress on Computational Mechanics scheduled for July 19-24, 2020 in Paris (France) has had to be canceled without a definitive date at the close of this report. Organizers are currently exploring alternative options together with IACM and ECCOMAS.

These series of ECCOMAS global meetings are complemented with more focused thematic conferences on state-of-the-art topics in computational sciences and engineering.



International Association for Computational Mechanics

The International Association for Computational Mechanics (IACM) was founded in 1981 and, since then, it has been strongly connected to CIMNE.

The goal of IACM is the promotion of advances in computational mechanics in a wide sense. IACM defines computational mechanics as the development and application of numerical methods and digital computers to solve problems in engineering and applied sciences with the objectives of understanding and harnessing the resources of nature.

Computational Solid Mechanics (CSM) and Computational Fluid Dynamics (CFD) are at the core of IACM activity. Subjects such as thermodynamics, electromagnetics, rigid body mechanics, control systems and some aspects of particle physics fall naturally within the scope of the IACM. Indeed providing a common forum for discussion, education and research information transfer between the diverse disciplines represented is the main *raison d'être* of IACM.

From 22 to 27 July, 2018, the IACM and the United States Association for Computational Mechanics (USACM), in cooperation with the Columbia University and the University of Texas, organized jointly the 13th World Congress on Computational Mechanics (WCCM XIII) and 2nd Panamerican Congress on Computational Mechanics (PANACM II) in New York City (USA). During this event, Prof. Antonio Huerta was elected new President of the IACM. Full professor in civil engineering at the Technical University of Catalonia (UPC) and a regular collaborator of CIMNE, Prof. Huerta had been the General Secretary of the IACM in the period 2010-2018.

IACM publishes a periodic bulletin and supports Special Interest Conferences, IACM Symposia and courses in various fields of computational mechanics.



Prof. Huerta, President of the IACM



Conference during WCCM XIII



European Research Community on Flow, Turbulence and Combustion

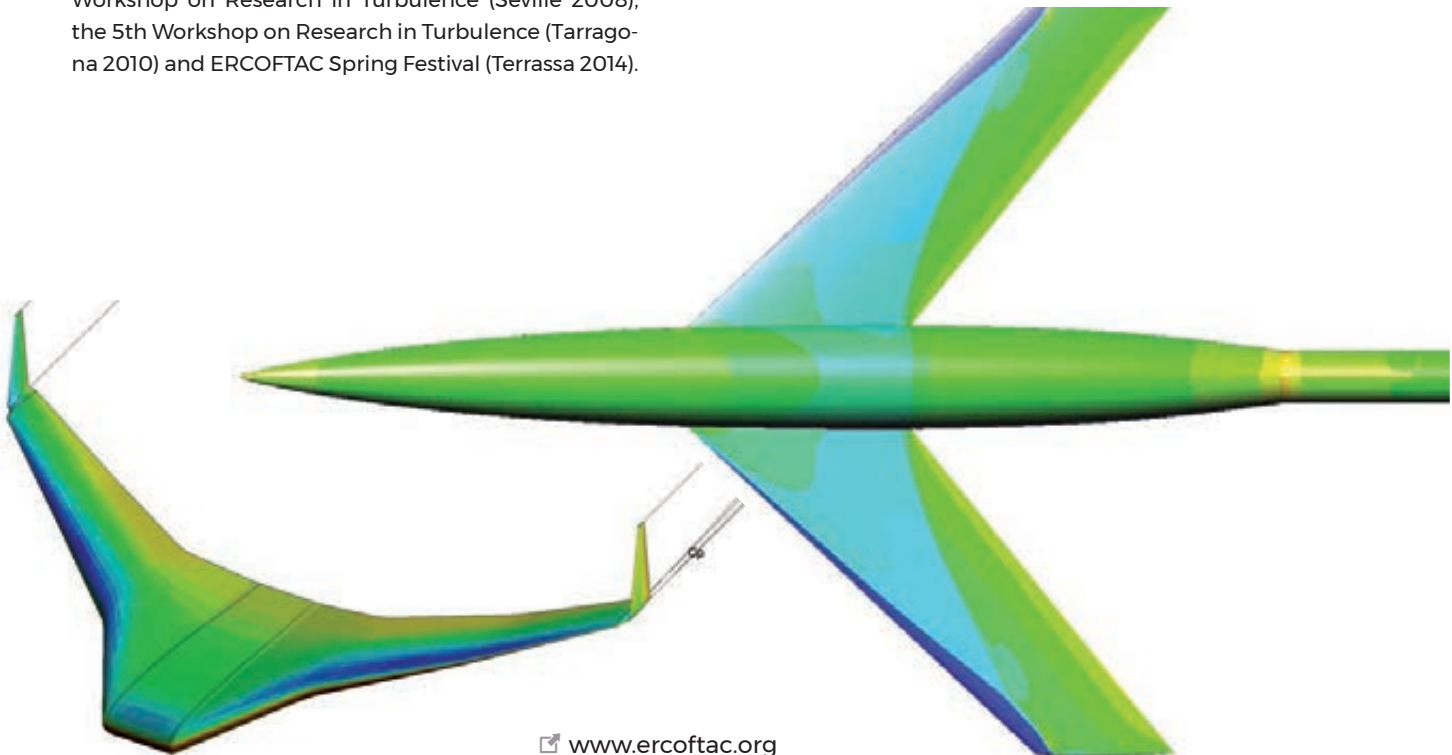
The ERCOFTAC network was founded in 1987. It is promoted by several European aerospace companies and it groups together more than 60 research centers and companies working primarily in the numerical simulation of fluid mechanics problems in engineering.

Since 1989, CIMNE is a Pilot Centre of ERCOFTAC in Spain.

CIMNE, acting as Pilot Centre, has organized a number of activities, including, among others, the 8th European Turbulence Workshop (Barcelona 2000), the Europe-Russia Workshop (Barcelona 2006), the 3rd Workshop on Research in Turbulence (Seville 2008), the 5th Workshop on Research in Turbulence (Tarragona 2010) and ERCOFTAC Spring Festival (Terrassa 2014).

CIMNE has coordinated the FP7 E-Caero projects 1 and 2 (E-CAERO: European Collaborative Dissemination of Aeronautical research and applications, 2009-2013 and 2014-2017).

Both projects aim to promote joint activities of different scientific associations in the aeronautic field in Europe. ERCOFTAC is a partner in both projects.





International Association of Aulas CIMNE

The International Association of Aulas CIMNE (AIAC) is a non-governmental non-profit civil organization with the objective of fostering the advances of numerical methods in a common academic space: the Aulas CIMNE (Joint Labs). Aulas CIMNE are the basis for cooperation in scientific, technological and training among its members, aiming to achieve social and economic improvements in society.

Mission

To contribute to the development, strengthening and consolidation in:

- Training, by promoting and organizing courses of interest to its members.
- Scientific and technological research, including the processes of innovation, adaptation and technology transfer in strategic areas.
- The use of numerical methods in engineering as a tool to help developing countries.

The interaction of the members of the Association with the society at large, by disseminating scientific and technological advances that drive progress.

AIAC members benefit from:

- Continuous education, enhancing the set of high-level human resources of Aulas CIMNE and the Network and by the competitive advantage of installed capacity in the regions.
- The development of multi- and inter-disciplinary activities in areas of basic research, applied research and experimental developments.
- Exchange programs for teachers, researchers, students and academic and innovation managers.
- Research and development programs in emerging knowledge areas, related to new professional profiles identified as strategic.

AIAC's vision

To promote a common project and create a network of experts from around the world, which results in the international benchmark in the field of numerical methods in engineering.

AIAC intends to encompass an international environment in which scientists, technical staff and engineers can benefit directly from CIMNE's tools (developed or in development), international collaborations, participation in projects, exchange of information and industry technology transfer, among others.



Dissemination

Knowledge transfer is of vital importance for CIMNE, which invests great efforts in training and education addressed to its research staff as well as to graduates and professionals from schools of engineering and universities in applied sciences.

CIMNE regularly organises seminars, coffee talks, courses and post-graduate studies related to the theory and application of numerical methods in engineering. It has also developed a web environment for distance learning education via Internet.

The research centre also plays an important role as event organizer in the field of computational engineering. In the following pages, a summary of the conferences organized by CIMNE Congress Bureau during 2019 can be found. The wide agenda of congresses and conferences that will take place during 2020-2021 it is also included.

Training

POST-GRADUATE STUDIES

COURSES

SEMINARS

COFFEE TALKS

CONFERENCES



Post-graduate Studies

CIMNE supports the organization of the following postgraduate degrees awarded by the UPC · BarcelonaTech.

Master Degrees

Master on Numerical Methods in Engineering

Duration: 2 academic years, 120 ECTS

cimne.com/mumni

Master of Science on Computational Mechanics

Duration: 2 academic years, 120 ECTS

cimne.com/mcm

Doctoral Degrees

Simulation in Engineering and Entrepreneurship Development- SEED

Duration: PhD studies, 3-4 years period

cimne.com/emjd-seed

PhD Degree in Structural Analysis

Duration: PhD studies, 3-4 years period

cimne.com/phd-structural-analysis

Courses

CIMNE has also been organizing courses and workshops related to its field of expertise:

Ibercursos

Online courses held in 2019:

- Initiation (English)
- Advanced courses (only in Spanish):
 - Dam breaks
 - Water quality
 - Hydraulic works
 - Sediment transport

COMPLAS Course 2019

15th Short Course on Computational Techniques for Plasticity

Barcelona, 2-3 September 2019

MUSLOC 2019

Multi-scale analysis of slopes under climate change.

A cross-disciplinary workshop

Barcelona, 19-20 September 2019

CIMNE Coffee Talks in 2019

Large scale simulations of 3D geophysical flows

Nicola Germano, University of Chieti-Pescara, Italy; and Simon Wenczowski, Technical University of Munich, Germany – 25/02/2019

Fatigue in Composites

Joel Jurado, CIMNE, Spain – 11/03/2019

Digital Twins in Structural Engineering Classrooms

Rolando Chacón Flores, Technical University of Catalonia, Spain – 20/03/2019

The history of CIMNE, a personal vision

Eugenio Oñate, CIMNE/ Technical University of Catalonia – 03/04/2019

Construction of general multiscale methods using dimensionality reduction

Joaquín A. Hernández, CIMNE/ Technical University of Catalonia – 30/04/2019

Introduction to GiT – practical course for beginners

Javi Gárate, CIMNE – 14/05/2019

Numerical and experimental procedure for damage identification on railway bridges

Pablo Sierra, CIMNE – 15/05/2019

Quasi-zero-thickness interface elements in Kratos

Ignasi de Pouplana, UPC/CIMNE, Spain – 29/05/2019

Bridging the gap between social sciences and civil engineering

Irene Josa, Technical University of Catalonia, Spain – 12/06/2019

Transport engineering and urban planning: design of public transport networks in a concentric city

Marcos Medina, CONICYT, Chile – 10/07/2019

InfoDay Call “Retos Colaboración 2019”

Project Management Department, CIMNE – 09/10/2019

Mixed finite element modeling of quasi-brittle cracks under monotonic and cyclic loading with enhanced accuracy

Gabriel Barbat, Technical University of Catalonia – 31/10/2019

Reduce Order Modelling with Application to Thermal Problems in Kratos Multiphysics

Jose Raúl Bravo, CIMNE – 13/11/2019

Scalable distributed asynchronous Monte Carlo workflow design

Riccardo Tosi, CIMNE – 27/11/2019

Simulating viscoelastic fluid flows with high Weissenberg number using a VMS stabilized formulation

Laura Moreno, CIMNE/ Technical University of Catalonia – 11/12/2019



CIMNE Seminars in 2019

Computational Methods for Multiphysics Problems

Eric Feulvarch, National Engineering College, Saint Etienne (France) – 13/02/2019

hp-Adaptivity for Dummies

David Pardo, Ikerbasque, the University of the Basque Country UPV/EHU and Basque Center for Applied Mathematics (BCAM), Bilbao (Spain) – 19/02/2019

Computational Material Design (CMD). Research lines of the CMD group at CIMNE

Xavier Oliver, UPC/CIMNE, Barcelona (Spain) – 13/03/2019

Multiscale, Multi-phase Modelling of Proton Exchange Membrane Fuel Cells

Marc Secanell, University of Alberta, Edmonton (Canada) – 24/4/2019

Strategies for Improving Yard Performance at Container Marine Terminals

Sergi Saurí, UPC/CENIT, Barcelona (Spain) – 8/5/2019

Computational Flexoelectricity

Irene Arias, ICREA (LaCàN)/CIMNE, Barcelona (Spain) – 22/5/2019

FreeFem ++ a toolbox to do solve PDE

Frederic Hecht, Université Pierre et Marie Curie, Paris (France) – 6/6/2019

Peridynamic, a simple yet powerful method for multi-physics problems involving crack nucleation and propagation

Farshid Mossaiby, University of Isfahan, Isfahan (Iran) – 19/9/2019

Data-Driven Engineering Modeling: Is it a Reinvention of Old Techniques or a Genuine New Paradigm

K. C. Park, University of Colorado, Colorado (Canada) – 15/10/2019

Recent Developments on reduced order modeling for flow mechanics

Joan Baiges, CIMNE, Barcelona (Spain) – 23/10/2019

Kratos Multiphysics time line

Pooyan Dadvand, UPC, Barcelona (Spain) – 6/11/2019

Modelling of machining with PFEM

Josep M. Carbonell, University of Vic, Vic (Spain) – 20/11/2019

Last advances of the PFEM for coupled problems

Alessandro Franci, UPC/CIMNE, Barcelona (Spain) – 4/12/2019



Conferences organized by CIMNE in 2019



MARINE 2019

VIII Conference on Computational Methods in Marine Engineering

13-15 May, 2019, Göteborg, Sweden # **NP:** 187



ADMOS 2019

International Conference on Adaptive Modeling and Simulation

27-29 May, 2019, El Campello, Spain # **NP:** 115



COUPLED 2019

VIII International Conference on Coupled Problems in Science and Engineering

3-5 June, 2019, Sitges, Spain # **NP:** 394



EMuS 2019

European Conference on Multifunctional Structures

11-12 June, 2019, Barcelona, Spain # **NP:** 37



CFRAC 2019

VI International Conference on Computational Modeling of Fracture and Failure of Materials and Structures

12-14 June, 2019, Braunschweig, Germany # **NP:** 243



SMART 2019

IX ECCOMAS Thematic Conference on Smart Structures and Materials

8-12 July 2019, Paris, France # **NP:** 213



COMPLAS 2019

XV International Conference on Computational Plasticity

3-5 Sept., 2019, Barcelona, Spain # **NP:** 400



SIM-AM 2019

II International Conference on Simulation for Additive Manufacturing

11-13 September 2019, Pavia, Italy # **NP:** 295

*NP: Number of participants

Upcoming conferences organized by CIMNE (2020-2021)



DBMC 2020

15th International Conference
on Durability of Building
Materials and Components
20-23 October 2020,
Barcelona, Spain



PARTICLES COURSE 2020

Short Course on Particle-
Based Methods in Engineering
and Applied Science
6-7 July, 2020, Barcelona,
Spain



WWCM 2020

World Congress on
Computational Mechanics &
ECCOMAS 2020

19-24 July, 2020, Paris, France

*(Cancelled due to COVID-19.
New dates will be announced on
wwcm-eccomas2020.org!)*



M2P

Math 2 Product

10-12 May, 2021, Vietri sul Mare,
Salerno, Italy



MARINE 2021

IX International Conference
on Computational Methods in
Marine Engineering
2-4 June, 2021, Edinburgh,
Scotland, UK



COUPLED 2021

IX International Conference on
Coupled Problems in Science
and Engineering
13-16 June, 2021, Chia Laguna,
South Sardinia, Italy



ADMOS 2021

International Conference
on Adaptive Modeling and
Simulation

21-23 June 2021, Gothenburg,
Sweden



CSAI 2021

Computational Science and AI
in Industry

7-9 June 2021, Trondheim,
Norway



COMPLAS 2021

XVI International Conference
on Computational Plasticity
7-10 September 2021,
Barcelona, Spain



STRUCTURAL MEMBRANES 2021

X International Conference
on Textile Composites and
Inflatable Structures
13-15 September 2021, Munich,
Germany



SAHC 2021

12th International Conference
on Structural Analysis of
Historical Constructions
29 September - 1 October
2021, Barcelona, Spain



PARTICLES 2021

VII International Conference
on Particle-Based Methods
4-6 October, 2021, Hamburg,
Germany

Awards

Chronology of the prizes awarded to CIMNE

Below we briefly review some of the awards granted to the research centre along its history.

SPECIAL MENTION TO THE CIUTAT DE BARCELONA AWARD 1999

Special Mention to the Ciutat de Barcelona Award 1999 in the category of Technological Research for the work carried out by Drs. P. Roca, M. Cervera and E. Oñate on the modelling and structural analysis of the Barcelona Cathedral.

NARCÍS DE MONTURIOL PLATE AWARD TO THE SCIENTIFIC AND TECHNOLOGICAL MERIT 1999

In 1999 the Generalitat de Catalunya granted CIMNE the Narcís de Monturiol Plate Award for Scientific and Technological Merit:

- For its contribution to the development of new methods for analysis and design for products and processes in engineering.
- For fostering the cooperation between industry and university research groups.
- For the organization of training activities and the promotion of science and technology at an international level.

2002 IST PRIZE TO THE BEST PRODUCT OF THE INFORMATION SOCIETY TECHNOLOGIES, EUROPEAN COMMISSION (EC)

The EC granted the IST Award to the pre/post processor system GiD (www.gidhome.com) developed at CIMNE.

CIUTAT DE BARCELONA 2002 AWARD IN TECHNOLOGICAL RESEARCH

On February 11th, 2003, the Ciutat de Barcelona Award in Technological Research was awarded to the CIMNE research team formed by Eugenio Oñate, Ramon Ribó, Enrique Escolano, Miquel Pasenau and Jorge Suit Pérez.

The prize recognized the development of the pre/postprocessor GiD

AWARD DURAN I FARRELL FOR RESEARCH AND TECHNOLOGY UNIVERSITAT POLITÈCNICA DE CATALUNYA, 2004

The Award was delivered to CIMNE scientists Dr. Oñate and Dr. García for their work entitled: "Development of a new finite element code for the hydrodynamic study of vessels. Applications to the design of sailing ships for the America Cup race".

CUBAN NATIONAL PRIZE 2016 TO THE SCIENTIFIC RESEARCH RESULT BY THE CUBAN ACADEMY OF SCIENCES

This award is a recognition of the research work entitled "Development of advanced technologies for the generation and packaging of particles focused on the methods of discrete elements".

The research was carried out by the Central University "Las Villas" of Cuba (UCLV) and the CIMNE within the Aula UCLV-CIMNE. It also involved the collaboration of the universities of Leuven (KU Leuven, Belgium), and Brasilia (UnB, Brazil), as well as foreign and local institutions.

FIMA 'TECHNICAL NOVELTY' AWARD 2018

The Centrifugal Spreading Simulation Software, SpreadDEM, developed by CIMNE, has been awarded by the 40th International Fair of Agricultural Machinery (FIMA) with the "Technical Novelty" award in the category of "Agricultural Management Solution". With this award, the Fair recognizes the companies that present devices and systems with direct application in agriculture and rural areas, which bring remarkable innovation to the sector.



Awards and honours to CIMNE Scientists in 2019

Below we list the most outstanding recognitions and awards granted to CIMNE scientists during the year 2019.



EDUARDO ALONSO & NURIA PINYOL

Telford Gold Medal for the paper "Thermal effects in landslide mobility", by the British Institution of Civil Engineers (ICE), 2019.



ANTONIO GENS

Laureate Engineer, Royal Academy of Engineering of Spain (RAI), 2019.



XAVIER OLIVER

Proof of Concept, European Research Council, 2019.



EUGENIO OÑATE

Ildefons Cerdà Medal 2019, Institute of Civil Engineers in Spain (Catalonian Branch), 2019.



JAVIER SAN MAURO

Carlos González Cruz 2018 Prize (exaequo) for the best PhD thesis related with hydraulic and dam engineering delivered by the Technical University of Madrid, 2019.

el Periódico SECCIÓN DE NOTICIAS

SOCIEDAD ¿Tiene remedio Rodalies?

El traspaso de parte de la gestión a la Generalitat apenas ha mejorado un servicio castigado otra vez por los accidentes y las averías

Los expertos recetan más dinero para mantenimiento, un organismo coordinado y abandonar las riñas políticas

Manuel Vilas
Martes 14 - Domingo, 17/02/2019 | Actualizado el 18/02/2019 a las 11:09 CET



Uno de los trenes desviados en Castellón. / MARC VILA

Aunque la celebre frase de la campaña de Bill Clinton contra Bush padre -'es la economía, estúpido'- ya está demasiado manoseada, le viene al pelo al problema de las Rodalies de Barcelona. Lo que parece algo irresoluble no es lo es tanto. Tres expertos de primera fila coinciden en que es una cuestión tan simple como **destinar mucho más dinero a las inversiones y al mantenimiento**. Más financiación a la que habría añadir una mayor coordinación entre los distintos actores que intervienen en su gestión. Es decir menos rifa política sobre que es lo que hay que traspasar o no y más entendimiento.

Este febrero se cumplen diez años desde que el expresidente José Luis Rodríguez Zapatero anunciara una gran inversión de 4.000 millones para solucionar los problemas de una red que poco antes, en 2007, había reventado con un cúmulo de averías y retrasos. Están a punto de cumplirse también diez años de otra decisión del expresidente: el traspaso de la gestión de Rodalies a la Generalitat. Mientras, las noticias apuntan a que ni lo uno ni lo otro han servido para gran cosa. En poco más de dos meses se han producido dos accidentes graves (*Vicarifeses y Castellón*) y el año ha empezado con nada menos que 16 incidencias y sus correspondientes retrasos.

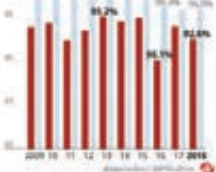
El balance que hacen los expertos es inequívoco. Desde que se ejecutó el traspaso, el 1 de enero del 2010, la situación apenas ha mejorado. **Roger Sensarrich**, experto de Politikon en ferrocarriles, califica del balance de "mediocre". La Generalitat va más allá y habla de que la operación fue un puro "experiencia".

Los datos lo corroboran. Entre 2009 y 2018 la puntualidad ha caído del 94% al 92%, mientras los pasajeros han crecido un 3%, mientras en otros medios metropolitanos subían un 20%.

Usuarios anuales de Rodalies
(Miles de millones de pasajeros)



Puntualidad
● SANSU ● SANSU



MOBILE WEEK MOBILE WORLD CAPITAL BARCELONA

Inicio About Programa Exposición Plan C Join Us

Experiencias de innovación tecnológica en el espacio urbano

INSCRIBETE

Ponentes

Andrea Carandell
CEO de Novatix, empresa dedicada a la fabricación de iluminación sostenible y eficiente y de mobiliario urbano funcional para las personas con discapacidad como en bancos y mesas, sillas, aparcamientos para parques infantiles y instalación de alumbrado artístico. Con sus productos, tienen el objetivo de conseguir una gestión inteligente y ofrecer soluciones a los problemas que presentan las Smart Cities.

Kristi Shalla
Directora de desarrollo de proyectos CENIT Barcelona, España. Directora de desarrollo de proyectos de CENIT (Center for Innovation in Transport). Experta en transporte y movilidad urbana como pautas centrales para crear ciudades habitables y en construcción de soluciones sostenibles para el desarrollo de ciudades y comunidades.

Angel Arenas
Director General del Patronato municipal de Turismo de Terrassa, España. Director gerente del Patronato municipal de Turismo de Terrassa. App de realidad aumentada Images Reality Terrassa, una aplicación Smart City al servicio de los visitantes que permite una inmersión "in situ" en la antigua ciudad romana de Tarraco a través de smartphones o tablets.

Tipo: Experiencias
Dirección: Carrión de Santa Eugènia, 19, 17005, Girona
Donde: Sala de actos del Colegio de Aparejadores, Arquitectos Técnicos e Ingenieros de Edificación
Fecha: 22/02/2019
Horario: 10:45 a 12:00

Coordina: Colegio de Aparejadores, Arquitectos Técnicos e Ingenieros de Edificación y AENEG (Asociación de Empresas de Nuevas Tecnologías de Girona).

Tags: #SmartCities, #Innovación

INSCRIBETE **COMPARTIR**

TRANSPORT

TOP: Kristi Shalla, collaborator of CENIT Group for Innovation in Multimodal Transport,

SOURCE: MWC

PUBLICATION DATE: February 2019

LEFT: Sergi Saurí, director of CENIT Group for Innovation in Multimodal Transport, participates as an expert in this journal article that analyses the problems of the commuter trains of Catalonia.

SOURCE: El Periódico

PUBLICATION DATE: February 2019



innovaspain
EL PERIÓDICO LÍDER DE LA INNOVACIÓN EN ESPAÑOL

Julio García Espinosa, cofundador de Scipedia: "Debemos aprovechar el uso que otros hagan de nuestro conocimiento"

El profesor de la UPC e investigador del CIMNE es uno de los impulsores de la nueva plataforma que promueve la Ciencia Abierta.

Por Juan F. Calero · 13 marzo 2019

La comunidad científica está de acuerdo al menos en una cosa: la difusión de sus avances es muy mejorable en multitud de aspectos. Julio García Espinosa, profesor de la Universidad Politécnica de Cataluña (UPC) e investigador adscrito al Centro Internacional de Métodos Numéricos en Ingeniería (CIMNE) es uno de los fundadores de *Scipedia*, una nueva red social profesional que ofrece una solución completa para la Ciencia Abierta e integra una plataforma online de publicación para acceder de forma gratuita y universal a los artículos científicos.

Le acompañan en el proyecto Ramón Ribó Rodríguez, director de Compass ES, empresa spin-off de CIMNE, y Luis Fernández Cotero, que aportará su experiencia en el campo de las .com. "En 2015 empezamos a reflexionar en torno a los problemas de acceso abierto a publicaciones y datos científicos relevantes dentro del propio CIMNE", explica García Espinosa. Sin darse cuenta estaban moldeando la versión "beta" de *Scipedia*. Diseñaron un portal público en el que dar cabida, de forma organizada, a las revistas del CIMNE y a miles de artículos, monografías, actas de congresos y otros informes científicos generados por investigadores del centro.

Este desarrollo fue complementado con la creación de perfiles de los diferentes proyectos de investigación que ofrecían la posibilidad de vincularlos a colecciones de documentos, datos, modelos, software, etc., a los que dan lugar los propios proyectos. La incorporación del "gem" de red social al facilitar el contacto entre investigadores - quienes podían dar de alta su perfil, gestionar sus recursos, crear grupos de discusión o editar documentos por la vía colaborativa- terminaba de sentar las bases de *Scipedia*. "Desde el principio supimos que podría ser una plataforma útil para cualquier centro, equipo o investigador individual, y por ello siempre ha estado abierta a toda la comunidad científica".

OPEN SCIENCE

INTERVIEW TO JULIO GARCÍA,
COFUNDER OF THE OPEN SCIENCE
PLATFORM DEVELOPED BY A CIMNE
SPIN-OFF COMPANY

SOURCE: *InnovaSpain*

PUBLICATION DATE: March 2019



Aula ELA - Bellvitge Pacientes

Marcadores de voz para la detección temprana de la afectación bulbar en pacientes con ELA

La identificación temprana de la afectación bulbar en pacientes con ELA es fundamental para mejorar el diagnóstico y el pronóstico de la enfermedad. La detección de los primeros indicios con anterioridad al diagnóstico clínico puede ser la clave para aumentar la calidad de vida y la supervivencia de los pacientes. El detentore del habla puede comenzar hasta 3 años antes del diagnóstico definitivo. Estudios previos demuestran el valor de las medidas objetivas de la voz sobre la presentación clínica para detectar alteraciones orales motoras, bien sea a través del habla o de la voz.

A pesar de los mejores esfuerzos, hasta el 10% de los pacientes con ELA son inicialmente mal diagnosticados. En el momento del diagnóstico, hasta el 30% de los pacientes presentan síntomas bulbares. No existe un procedimiento de diagnóstico estandarizado para evaluar la disfunción bulbar en la ELA. El objetivo del estudio es encontrar marcadores de progresión de la enfermedad a través de la extracción de características de voz y técnicas de clasificación de Inteligencia Artificial para producir la participación de la región bulbar y su progresión.

El estudio propone un nuevo procedimiento de diagnóstico para caracterizar las funciones de la voz de los pacientes. Primero extraeremos las características de la voz a través de un análisis acústico y luego, realizaremos pruebas de combinación de características y de validación cruzada para evaluar que técnicas ofrecen un mejor rendimiento de acuerdo con las tasas de error de clasificación y los valores de parámetros óptimos.

ELA

PHD ALBERTO TENA, RESEARCHER AT
CIMNE TIC, INVESTIGATES ON AN ICT
SOLUTION FOR EARLY DETECTION OF ELA

SOURCE: *Aula ELA (Bellvitge Hospital)*

PUBLICATION DATE: March 2019

Canales sectoriales
PLÁSTICO

El objetivo principal de Fibreship es superar el gran desafío técnico y normativo que supone:

Polímeros reforzados con fibra sustituyen al acero en la construcción naval

Reducción inmensurable 16/06/2019

Fibreship, uno de los proyectos de investigación de mayor alcance financiados por la Unión Europea con 9 M€, a través del H2020, de los 11 M€ totales del coste previstos, se ha consolidado como uno de los proyectos más innovadores para la construcción naval europea. Se trata de sustituir el acero utilizado actualmente en la construcción naval convencional de buques de gran eslora por material de FRP (quien sabe referirse con fibra).

El objetivo principal de Fibreship es superar el gran desafío técnico y normativo que supone:

Para llevar a cabo este objetivo, el equipo de Fibreship lleva trabajando desde mediados de 2017 en la implementación de esta tecnología y el diseño de tres tipos de buques de más de 50 metros de eslora, considerando como los más representativos para mejorar el tránsito en el futuro: buques de transporte de carga como portacontenedores (de unos 240 metros de eslora), buques de transporte de pasajeros y yates, como es el caso de un buque de más de 200 metros y en la tecnología de buques de servicios auxiliares, un submarino de 50 metros de eslora.

Este ambicioso proyecto de innovación, liderado por la empresa española Fibreship y Servicios de Ingeniería S.L. (FIS) junto a otros cuatro entidades suministradoras líderes internacionales de materiales tecnológicos (Compass, Compasys, el Instituto Español de Oceanografía (IEO), Centro Tecnológico Sotermar y otros), 14 socios europeos entre los que destacan Airbus y Hochtief, marcará el futuro de la industria de construcción naval: mejoras de eficiencia, tecnología innovadora, calidad, sostenibilidad y protección por el medio.

Este desafío tecnológico e innovador para que "agor" generen en el mismo tiempo el mayor rendimiento que se permita. Para ello hay que definir y definir los mejores materiales innovadores de FRP y su aplicación de diseño a construcción naval, realizar nuevos diseños y pruebas de producción, generar metodologías de producción e inspección, y desarrollar nuevos modelos de negocio de evaluar el rendimiento de la estructura, calidad, eficiencia, sostenibilidad y protección por el medio.

El proyecto que Fibreship en Júcar incluye el estudio de la producción y desarrollo de técnicas de montaje modular en diferentes escalas, el desarrollo de los diseños de montaje de calidad industrial y el control de calidad a largo plazo al desarrollo de procedimientos de inspección, reparación y mantenimiento y el análisis de gestión de la generación de residuos, todo ello a lo largo del desarrollo de buques FRP. Como resultado del proyecto, a lo largo del 2019 se construirá un buque de buques innovadores, en el que se incluirán la mayoría de diseños y tecnologías avanzadas en Fibreship respecto a la fabricación de estructuras compuestas en buques de gran eslora.

Una apuesta innovadora con múltiples beneficios

El primer punto de partida de Fibreship es cómo definir una estructura compuesta que responda a las exigencias de FRP en la construcción naval en el sector de transporte marítimo.

Desarrollar entre otros:

- Una significativa reducción de peso estructural de hasta un 70% que implica un ahorro de combustible y una reducción de las emisiones de gases de efecto invernadero.
- Un mayor rendimiento del coste de construcción de mantenimiento debido a la ausencia de corrosión.
- El uso de tecnología avanzada para la construcción de estructuras de alta calidad.
- Mayor flexibilidad estructural y mayor capacidad de adaptación.

OPINIÓN

Entrevista a Elena Domínguez, investigadora de Ampel y coordinadora de la jornada VII International Seminar Biopolymers and Sustainable Composites

"Las tecnologías de biopolímeros sostenibles son el principal reto, ya que los biopolímeros están desarrollando capacidad para más tipos de materiales, como el LRP y el LRP."

Para tratar los residuos de su empresa necesita una prensa hidráulica vertical

Entrevista a Iván Navarro, project manager de ADSI plastics

"En la fibra de carbono, los fabricantes buscan soluciones tecnológicas para mejorar la calidad de los productos."

Entrevista a Santi Riera, director general de Biogeo

"La innovación está en el sector de la fibra de carbono."

Entrevista a Carlos Navarro, presidente de Exponorm, el Encuentro Internacional de la Química

"El objetivo de una química sostenible es mejorar la calidad de los productos y reducir el impacto ambiental de la producción."

OPINIÓN

LA RAZÓN ACTUALIDAD

ACTUALIDAD

Fibreship apuesta por materiales compuestos para la construcción naval

El proyecto, liderado por empresas españolas, busca minimizar el impacto medioambiental y el consumo de energía

El proyecto, liderado por empresas españolas, busca minimizar el impacto medioambiental y el consumo de energía

El proyecto **FIBRESHIP** abre una nueva puerta para la construcción naval de buques de gran eslora y apuesta por los materiales polímeros reforzados con fibra (FRP) en vez de por el acero. El objetivo es construir buques más ligeros a nivel de estructura y que tengan menor consumo de energía e impacto medioambiental. FIBRESHIP, que se encuentra dentro del Programa Marco de Investigación e Innovación de la Unión Europea Horizonte 2020, está financiado por la Comisión Europea con 9 millones de euros, siendo la previsión del coste total de 11 millones, lo que constata que se trata de uno de los proyectos europeos más ambiciosos e innovadores.

El papel de España en esta aventura es muy significativo ya que la empresa, Técnicas y Servicios de Ingeniería (TSI) se encuentra a la cabeza del proyecto. Además, otras cuatro entidades nacionales están colaborando en el desarrollo de FIBRESHIP: Centro Internacional de Métodos Numéricos (CIMNE), la empresa Compaq S.L., el Instituto Español de Oceanografía (IEO) y el Centro Tecnológico Sotermar. El consorcio lo integran 18 socios europeos de 11 países.

Desde el 24 de junio, el demostrador de FIBRESHIP se encuentra en el Astillero (Mar de Francia). Se trata de una parte de la estructura de un buque oceanográfico, con un peso de 20 toneladas y construido en su totalidad por materiales compuestos. Estamos ante el comienzo de lo que será la mejor alternativa para garantizar la sostenibilidad y la competitividad de la construcción naval en toda Europa. El demostrador, que se empezó a construir a finales de 2018 y que mide 11x14x6 metros, está conformado por diferentes tipos de fibras y resinas, y servirá para comprobar los resultados de los estudios que se desarrollan en el proyecto, así como para garantizar la viabilidad del mismo. Por ahora, no solo se ha demostrado que a nivel técnico es posible, sino que también en el ámbito económico se han desarrollado métodos de construcción industrializables perfectamente reales. Detrás de este innovador demostrador hay una gran cantidad de estudios y ensayos experimentales que han tenido como objetivo encontrar los materiales y las combinaciones más adecuadas para la construcción. FIBRESHIP no está descartando nada y ya se han realizado comprobaciones mecánicas, simulaciones de comportamiento y ensayos de fuego, algo totalmente necesario al ser la primera vez que estos materiales se usan en un buque de estas dimensiones.

NAVAL ENGINEERING

FIBRESHIP PROJECT PARTICIPATED BY CIMNE AND ITS SPIN-OFF COMPASS: TO OVERCOME THE TECHNICAL CHALLENGE OF REPLACING STEEL IN SHIPBUILDING WITH COMPOSITE MATERIALS AND FIBER POLYMERS.

SOURCES: Canales Sectoriales, La Razón

PUBLICATION DATE: March 2019

DIARIO ECONÓMICO DEL MEDIO DE LA SALUD

PlantaDoce.

EMPRESA ENTORNO PÚBLICO AEN SALA DE IMPRESA

14 MAR 2019 - 20:00
Más noticias (Categoría)

CONTENIDO DEL ARTÍCULO
—Expertos que investigan en el sector "Healthapp"

COMENTARIOS
in f

DEL TEMA
in

El creador de 'apps' médicas Healthapp, a la conquista de Estados Unidos y Escandinavia

La empresa, con sede en Terrassa (Barcelona), también está cerrando acuerdos con los grupos Althala, Quirónsalud o Ita para desarrollar plataformas móviles para los pacientes de sus centros.



Consolidación en España y aterrizaje en otros mercados. Este es el objetivo de los próximos años de Healthapp, una compañía especializada en el desarrollo de aplicaciones médicas para móviles. La empresa ha anunciado la llegada de distintos acuerdos con grupos hospitalarios de la Península y tiene previsto avanzar su proceso de internacionalización en Boston (Estados Unidos) y Escandinavia.

"La expansión depende de la consolidación del equipo", señala Jordi Cusidó, cofundador y consejero delegado de la firma. En este sentido, 2019 se presenta como el año para conseguir estos objetivos. "Tenemos en marcha seis proyectos que evolucionan de manera secuencial", comenta el directivo.

Cada uno de ellos, valorado entre 30.000 y 100.000 euros, está suscrito por algunos de los grupos hospitalarios más destacados en España. Se trata de Althala (agente del Sant Joan de Déu, Quirónsalud e Ita. Además, Healthapp ha llegado a acuerdos con el Hospital Clínic de Barcelona, el Consorci Sanitari de l'Ànima (CSA) y el Consorci Sanitari de Terrassa (CST).

Healthapp está desarrollando seis proyectos valorados entre 30.000 euros y 100.000 euros cada uno

"Las aplicaciones que desarrollamos se adaptan al terapeuta", comenta Cusidó. "Hablamos con los profesionales y, en base a su respuesta, elaboramos un cuestionario para los pacientes", especifica el cofundador de la start up. A partir de este punto, los pacientes disponen de una herramienta que pueden descargar para actualizar su estado de salud y facilitar al envío de datos clínicos a los médicos.

Ahora mismo, Healthapp dispone de tres plataformas para pacientes, todas centradas en el campo de los trastornos alimentarios. La más destacada lleva por nombre TCAss, una app que permite a aquellos que siguen un tratamiento registrar sus emociones, comidas y diario personal desde un smartphone, además de recibir premios por actualizar esta información. TCAss está disponible en 20 centros diferentes y pone en contacto a un total de 80 terapeutas y cerca de mil pacientes.

"La clave es enganchar al paciente a la terapia", afirman desde Healthapp. Durante los próximos meses, la empresa confía en sacar al mercado otras tres aplicaciones centradas en otros campos como las autolesiones.

HEALTH / TECHNOLOGY

THE SPIN-OFF OF CIMNE HEALTHAPP STARTS ITS INTERNATIONALISATION

SOURCE: *Planeta Doce*

PUBLICATION DATE: March 2019

ESEficiencia

Portal de Eficiencia y Servicios Energéticos

INICIO EFICIENCIA ENERGÉTICA SERVICIOS ENERGÉTICOS CLIMATIZACIÓN ILUMINACIÓN ENERGÍAS RENOVABLES SERVICIOS

Inicio - Eficiencia Energética - España participa en la implantación del Sistema de Información Energética de Edificios en Ecuador

Fecha: 02/04/2019

Buscar en el sitio...

Empresas y organizaciones españolas están trabajando en la segunda fase del **Proyecto SIE** de implantación del Sistema de Información Energética de edificios en Ecuador. La herramienta de contabilidad energética SIE se adaptará al contexto local ecuatoriano. La empresa **inergy**, como socio del proyecto, validará las adaptaciones.



Reunión donde se planifica la segunda fase del Proyecto SIE.

El pasado mes de marzo, Jordi Curiel y Gerard Mar del Grupo de Bioclimatismo y Eficiencia Energética (BEE Group) de CIMNE y líderes del proyecto, viajaron a Ecuador para reunirse con representantes del Instituto de Investigación Geológica y Energética (IGIE) y planificar la segunda fase del proyecto en que la herramienta de contabilidad energética SIE se adaptará al contexto local ecuatoriano.

Análisis de datos

En la reunión participaron los directores de la Empresa Eléctrica de Quito (EEQ) y de la Agencia ecuatoriana de Regulación y Control de la Electricidad (ARCONEL). La reunión sirvió para constatar los buenos resultados del trabajo hecho hasta el momento y los ahorros potenciales detectados en los edificios a partir del análisis de los datos recogidos.

Durante esta segunda fase y a partir de los datos generados en la primera, el IGIE será el responsable de adaptar el software SIE de inergy a las condiciones locales. Como socio del proyecto inergy participará en la validación de las adaptaciones del Sistema de Información Energética de Edificio al contexto local.

Edificios de alta demanda energética

En esta segunda fase además se analizarán nuevas edificaciones en las provincias de la Sierra y la Amazonia, para conocer la realidad del consumo eléctrico nacional y crear acciones para su optimización. En última instancia, el IGIE, junto con el BEE Group, serán los responsables del monitoreo y análisis de datos de los cinco edificios considerados "grandes consumidores", para proponer después estrategias individualizadas para cada edificio.

ENERGY EFFICIENCY

BEEGROUP OF CIMNE PARTICIPATES IN THE IMPLEMENTATION OF THE ENERGY INFORMATION SYSTEM IN THE BUILDINGS OF ECUADOR

SOURCE: *ESEficiencia*

PUBLICATION DATE: April 2019



AUGMENTED REALITY IN OPEN SURGERIES

CIMNE, TECHNOLOGICAL PARTNER IN REALQUIRUR PROJECT, THAT CONSISTS OF APPLYING AUGMENTED REALITY IN OPEN HEPATIC SURGERIES

SOURCES: CatalunyaPress, Cronica, La Razón, La Vanguardia,

PUBLICATION DATE: May 2019

INFLATABLE STRUCTURES

BUILDAR SETS UP THE WORLD'S LARGEST INFLATABLE HANGAR IN SAUDI ARABIA

SOURCES: *La Vanguardia* and *Inside Industry Magazine*

PUBLICATION DATE: July 2019

LA VANGUARDIA | Economía

El mayor hangar hinchable

La catalana Buildar instala su novedoso producto en el aeropuerto saudi de Jeddah

La empresa Buildar, una spin-off nacida del centro de investigación Cimne vinculado a la UPC y a la Generalitat, ha instalado con éxito en el aeropuerto de Jeddah (Arabia Saudí) el mayor hangar hinchable del mundo -con tubos de 8 metros de diámetro y 78 metros de longitud y longitud de 100 metros-. El cliente es la compañía aeronáutica Saudi Aeronautical Engineering Industries (SAEI).

El hangar se ha proyectado y fabricado por Buildar en su fábrica de Sant Feliu de Llobregat en un tiempo récord de cinco meses y en junio se transportó a Arabia para su instalación. El coste total del proyecto oscila a 8,4 millones de euros, lo que incluye el coste de la estructura inflable por valor de 2,9 millones, las instalaciones interiores por otros tres millones y la obra de instalación de 2,2 millones de euros. El hangar está fabricado con fibra sintética de PVC que se adapta al terreno. Se trata de la estructura inflable más grande del mundo y un desafío de la ingeniería, con 8,4 metros de altura, 82 metros de ancho y 78,6 metros de largo, y equipada con un sistema de aire acondicionado. El proyecto ha sido financiado por el Ministerio de Sanidad y Consumo de la Generalitat de Catalunya.

Buildar ha creado el grupo Spin-Off de Investigación y Desarrollo de la UPC y la Generalitat de Catalunya. En 2008, los investigadores de la UPC y del Cimne y desde entonces ha desarrollado tecnologías de inflables en la que participan expertos de todo el mundo.

LA VANGUARDIA | Economía

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THE FUTURE? It's inflatable

Buildar's business model of designing, building, installing and maintaining large inflatable hangars for aeronautical and industrial applications is so much more than simply air. The award winning and record breaking company is popping up with instant inflatable structural solutions all over the world. James Willis discovered more about this unique concept in conversation with Buildar's Commercial Director, Felipe Cano.



SPECIMEN

Imagine the scenario. You are a CEO, running an airline or an MRO, and you need a new building, and fast. But you don't need just any building... it must be large enough to easily accommodate the world's largest commercial jet airliner. It must be 75m wide without supporting internal columns for the roof, impossibly long and 40m high. It must be fully enclosed to meet airline repair regulations.

Despite the urgency of the project, you know construction permission will take around six months, the build time will also be lengthy and then there is the cost.

In 2001, a company was created which can solve all these problems quickly and for a fraction of the usual price. Meet Buildar. In the run up to the new millennium, a team of scientists and engineers at the Polytechnical University of Catalonia developed software to examine the structural capabilities of inflatable buildings. The fruits of this research can now be seen from Europe to the Middle East.

Buildar creates large inflatable hangars, predominantly for the aeronautical sector. Its latest project in Jeddah, Saudi Arabia, is the largest inflatable building in the world. This new structure beats the previous world record, also set by Buildar, which was a hangar for Airbus at Getafe in Spain. Both house aircraft costing hundreds of millions of euros.

Securing valuable assets

An inflatable building might initially seem a peculiar choice to secure such valuable commodities, so how is Buildar meeting the requirements of such a demanding industry?

Buildar constructs the hangar using, in layman's terms, low pressure, fire resistant polyester tubes with a PVC coating. These are formed into a sturdy rib cage structure, supported by lateral air tubes. Once it has been constructed to the purchaser's exact specifications, the whole thing can be transported to the required site in a standard shipping container or air transport pallet.





ROBOTS IN BURIED ENVIRONMENTS

GOAGUA BETS ON THIS SPIN-OFF OF CIMNE THAT DEVELOPS POSITIONING AND NAVIGATION SOLUTIONS FOR MOBILE ROBOTS IN BURIED ENVIRONMENTS BASED ON DEEP LEARNING TECHNIQUES

SOURCE: *El Confidencial*

PUBLICATION DATE: August 2019



ARTIFICIAL INTELLIGENCE

CATALAN MUNICIPALITIES PARTICIPATE IN THE GAVIUS PROJECT BASED ON ARTIFICIAL INTELLIGENCE TO RELATE TO CITIZENS

SOURCES: *El Llobregat*, *KomunicaPress*, *TV3*

PUBLICATION DATE: November 2019

@2019 IN TWEETS / TOP TWEETS



CIMNE carries out an intensive activity through social media, with special attention to Twitter, where the centre has more than 1.300 followers. Below we highlight some of the 2019 tweets to explain CIMNE's activities through the networks.

JANUARY'19



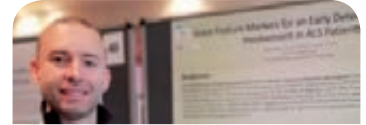
.@cimne researchers have published 100 scientific papers during 2018

FEBRUARY'19



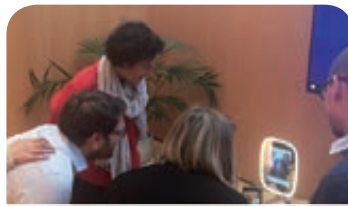
Avui al @cimne estem gravant. En uns dies us mostrem què ens expliquen les nostres investigadores #8M #DiaDeLaMujer

MARCH'19



.@CIMNETIC researcher Alberto Tena presents the preliminary results of his research on an ICT solution for early detection of ELA at RARE 2019 Congress @iCERCA @BiomedSharing #RareDisease #scienceforsociety

APRIL'19



.@okosmartframe launches its #OKOSmartMakeUpMirror in the Innovation Days #byMelia #digitalizacion

MAY'19



Congrats @DirectorCIMNE awarded the Ildefons Cerdà Medal 2019 by @caminscat #PremisCerdà #civilengineering

JUNE'19



.@cimne @BureauCongress bring together about 1,000 experts in the first half of 2019 #numericalmethods #dissemination #civilengineering #computationalmechanics

JULY'19



Professor @cimne Xavier Oliver, awarded a Proof of Concept 2019 by @ERC_Research. Congrats!

AUGUST'19



.@cimne will participate in two new @EU_H2020 projects: KYKLOS 4.0 (Digitisation and transformation) and ALTERNATE (Mobility for Growth). To know more about CIMNE projects, visit bit.ly/33ZUfZq @iCERCA

SEPTEMBER'19



El conseller de @territoricat @damiacalvet visita les instal·lacions de @Buildair a Molins de Rei @icerca

OCTOBER'19

.@cimne has received the accreditation "Centre for Excellence Severo Ochoa" by @CienciaGob @AgEInves. Thanks to all who have made this possible! @territoricat @coneixementcat @accio_cat @EscolaCaminsUPC @la_UPC @recercat @iCERCA @CienciaGob @gencat @tecnio_TI

NOVEMBER'19



La gerent del @cimne, Anna Font, durant la signatura del projecte #Cavius a l'@AjuntamentGava. #partnershipagreement

DECEMBER'19



.@cimne reune a todo su staff para dar el pistoletazo de salida al Severo Ochoa en un acto celebrado en la @EscolaCaminsUPC

**International Centre for
Numerical Methods in
Engineering**

www.cimne.com

Edifici C1, Campus Nord UPC
Gran Capità, s/n
08034 Barcelona, Espanya
Tel. +34 93 401 74 95
Fax. +34 93 401 65 17
e-mail: cimne@cimne.upc.edu



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de Catalunya**



**UNIVERSITAT POLITÈCNICA
DE CATALUNYA
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In cooperation with:

