

PhD Position in Industrial Manufacturing Processes group: "Computational Assessment and Optimization of Metallic Additive Manufacturing Processes" (VAC-2021-29)

Title of the PhD project: Computational Assessment and Optimization of Metallic Additive Manufacturing Processes

INTRODUCTION:

The International Centre for Numerical Methods in Engineering (CIMNE, www.cimne.com) is a research centre, created in 1987 by consortium between the Catalan Government and the Universitat Politècnica de Catalunya (UPC-BarcelonaTech), devoted to the development and application of numerical methods to a wide range of areas in engineering. CIMNE has been selected as a Severo Ochoa Centre of Excellence for the period 2019-2023, the highest level of recognition of excellence and leadership awarded to a research centre in Spain.

POSITION DETAILS

Number of vacancies: 1

Category: PhD (PHD2)

Location: Barcelona

Yearly salary (gross): 17.563,14 EUR

Working hours: Full time

Duration: 3 years

Starting date: No later than Sept 2021

FUNCTIONS TO BE DEVELOPED BY THE APPLICANT

CIMNE is looking for a **PhD Researcher** to be part of the Research and Technical Development (RTD) Group on Industrial Manufacturing Processes.

The functions assigned to the candidate will be:

- Complete a PhD on **Structural Analysis** at Universitat Politècnica de Catalunya – Barcelona Tech. The candidate is expected to complete the PhD thesis in a maximum of three years.
- Collaborate with various research groups within CIMNE and worldwide.

- To publish a minimum of three papers in JCR journals during the PhD period, author and co-author articles in high-impact international journals.
- Carry out quality research, training and management.
- Participate on the dissemination and outreach activities associated with the project.
- Participate in international conferences presenting her/his work.

DESCRIPTION OF THE PHD PROJECT:

This project aims to the development of computational techniques for the numerical simulation and optimization of Additive Manufacturing processes.

The possibilities of Additive Manufacturing (AM) compared to conventional manufacturing are the cause of its great usefulness for designing new components and parts due to its flexibility and versatility. The performance of AM components is very much related to the manufacturing process optimization. Therefore, the numerical simulation and optimization of the AM process is the main goal of this proposal.

One of the main task of the PhD research is the development of a Reduced Order Model (ROM) of the melt-pool (both thermal and mechanical models) allowing for a great improvement of the computational time required for the thermo-mechanical analysis.

The prospective outcome of the thesis is to contribute in the development of the ROM-AM module within the in-house HPC software framework for the numerical simulation of AM processes.

References

E. Neiva, S. Badia, A.F. Martin and M. Chiumenti, A scalable parallel finite element framework for growing geometries. Application to metal additive manufacturing, International Journal for Numerical Methods in Engineering, 119 (2019) 1098-1125, <https://doi.org/10.1002/nme.6085>

M. Chiumenti, X. Lin, M. Cervera, W. Lei, Y. Zheng and W. Huang, Numerical simulation and experimental calibration of Additive Manufacturing by blown powder technology. Part I: thermal analysis, Rapid Prototyping Journal, 23(2) (2017) 448-463, <https://doi.org/10.1108/RPJ-10-2015-0136>

M. Chiumenti, M. Cervera, A. Salmi, C. Agelet de Saracibar, N. Dialami and K. Matsui, Finite element modeling of multi-pass welding and shaped metal deposition processes, Computer Methods in Applied Mechanics and Engineering, 199 (2010) 2343-2359, <https://doi.org/10.1016/j.cma.2010.02.018>

REQUIREMENTS

1. The position is aimed at students (Spanish nationals, EU and non EU citizens) who have completed one of the following options:
 - a) The studies that lead to an official Spanish, or European Higher Education Area, 1st cycle university degree (BSc) in Structural, Civil or Mechanical Engineering and that have 180 credits (ECTS) of an official university degree.

b) A degree from a non-European Higher Education Area university that gives access to MSc studies in Structural, Civil or Mechanical Engineering.

2. Excellent academic record.
3. Advanced knowledge of Continuum and Computational Mechanics (master level).
4. High working knowledge of English (Minimum B2).
5. Programming skills: Fortran 2008 Object Oriented, Python
6. Windows and Linux OS
7. Previous research or academic experience in the field of the position
8. Language skills: Spanish

EVALUATION OF CANDIDATES

The requirements and merits will be evaluated with a maximum mark of 100 points. Such maximum mark will be obtained by adding up the points obtained in the following items:

- Academic record (60%)
- Previous research and academic experience in the field of the position (20%)
- Programming skills (10%)
- Language skills (10%)

HOW TO APPLY

Candidates must complete the "Application Form" form on our website, indicating the reference of the vacancy and attaching the following documents **in English**:

- Curriculum vitae
- A motivation letter
- Academic transcripts from all Undergraduate and MSc degrees
- Name and institutional contact information of two possible referees

The deadline for registration to the offer ends on 31st May, 2021 at 12 noon.

The shortlisted candidates may be called for an interview. They may also be required to provide further supporting documentation.

CIMNE is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, colour, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law. CIMNE has been awarded the HRS4R label.