**International Centre for
Numerical Methods in Engineering**

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JOB VACANCY ANNOUNCEMENT

VAC-2024-50 – PhD jointly proposed by SEAT and CIMNE: Sub-structuring and modular Reduced-Order Models for automotive structural mechanics and dynamics

Number of places: 1

Category: PHD Student – PHD1

Workplace: Barcelona

Salary (gross): 26.371,05€/year

Weekly working hours: 40h/week

Contract type: PHD

Duration: Three years

Functions to be developed:

Modelling structural mechanics and dynamics is a key asset for automotive design. At the level of the full vehicle, this is especially time consuming and represents a bottleneck in the design process. Moreover, the models are subject to uncertainty and structural instabilities leading to different collapse mechanisms. When confronted with Uncertainty Quantification that requires a high number of queries to the deterministic model, the computational cost increases dramatically. Thus, in the framework of analyzing and predicting the uncertainty of the modelling response of complex structures subject to extreme loads, it is crucial to develop efficient Reduced-Order Models (ROM).

This project aims at exploring the concept of sub-structuring for automotive simulations, dividing the vehicle in different modules to be coupled, and representing each of them with the more suitable nonintrusive ROM. Moreover, the efficiency of the coupling is strongly dependent of the description of the interfaces and the possible dimensionality reduction of their description. Thus, the ROMs are expected to be devised for each of the modules but also to their interfaces. The ROM strategies for the modules are expected to be nonintrusive because they must be trained with the commercial codes validated for the industrial practice.

The candidate integrating this project will benefit of:

- Integration within the research group of an automobile industry leader (SEAT-CUPRA).
- Develop proficiency in Machine Learning algorithms and their application in engineering analysis.
- Drive innovation in the application of Machine Learning to CAE domain, unlocking new possibilities for automotive safety, structural analysis, and performance optimization.

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Centre Internacional de Mètodes Numèrics a l'Enginyeria ® Q5850006G

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Required skills:

- Strong undergraduate and MS degree (or equivalent) record in computational science and engineering, mechanics, applied mathematics or related discipline.
- Good written and oral communication skills in English.
- Good knowledge of numerical methods for the approximation of partial differential equations (in particular, the finite element method).
- Knowledge of machine learning, reduced-order models, computational solid and structural mechanics and dynamics is not compulsory but will be considered an advantage.
- Advanced programming skills (such as Python, Matlab, …) and willingness to use commercial software for computational mechanics (VPS Pamcrash, Nastran…).
- Hard-working and enthusiastic attitude towards research and innovation.

Other valued skills (not mandatory):

- Interest in an industrial research career.

Qualification system:

The requisites and merits will be evaluated with a maximum note of 100 points. Such maximal note will be obtained summing up the following points:

- Academic qualifications: 60%
- Training and development: 10%
- Professional experience: 5%
- Knowledge of the Catalan language: 5%
- Knowledge of the English language: 10%
- Selective tests and interview: 10%

Candidates must complete the "Application Form" form on our website, indicating the reference of the vacancy and attaching the required documents.

The deadline for registration to the offer ends on October 22nd, 2024 at 12 noon.

The preselected candidates may be requested to send the documentation required in the "Requirements" and "Merits" sections, duly scanned, and may be called to go through selection tests (which might be of eliminatory nature) and / or personal interviews.

Commitment to inclusitvity:

At CIMNE, we champion workplace equity, diversity, and inclusion. We're committed to fostering a culture where everyone can thrive, leveraging diverse talents and backgrounds. We welcome all applicants

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regardless of color, religion, gender, origin, abilities, gender identity, sexual orientation, pregnancy or any other characteristic. Join us in building a community that values, celebrates, and respects every individual.

HR Excellence in Research:

CIMNE welcomes and supports the principles of European Commission's *European Charter for Researchers* and the *Code of Conduct for the Recruitment of Researchers*, embracing a transparent, attractive, and open labour market in research. The centre's Human Resources Strategy for Researchers (HRS4R) includes an action plan with actionable short and long-term actions to support a high-quality working environment for all. Further information can be found here.

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