

JOB VACANCY ANNOUNCEMENT

VAC-2024-11 – Postdoc position in computational methods for MHD flows

Number of places: 1

Category: Post Doc – PDOC 3

Workplace: Barcelona

Salary (gross): 28.608,23 € / year

Weekly working hours: 40h

Duration: 6 months

Functions to be developed:

The position is focused on the development of computational methods for the simulation of thermally coupled magnetohydrodynamic (MHD) flows in complex geometries. This problem is important for the development of fusion reactor technologies. Fusion is called to radically change the energy production worldwide, as it provides a large-scale, sustainable, carbon-free and, unlike fission, inherently safe source. A key component of fusion reactors is the breeding blanket which bound large part of the plasma chamber providing radiation shielding from free neutrons, extracting heat and regenerating the tritium burnt in the plasma. Its design is a complex task that requires advanced shape optimization based on MHD flows evaluation.

Existing tools are not mature enough to efficiently simulate MHD flows in the presence of strong magnetic fields, they are not able to properly capture complex blanket geometries. The goal of the position is to contribute to the development of computational methods to simulate MHD flows at high Hartmann numbers in complex geometries. To this end, unfitted finite element methods with an accurate treatment of the geometry will be extended to solve inductionless MHD equations.

The developed methods will be implemented in the Julia programming language, using the [Gridap](#) ecosystem as a basis, will be released as free and open source and will exploit HPC resources. The resulting code, [GridapMHD.jl](#), will be applied to simulate and analyse real-world breeding blanket concepts and to find optimal designs. This will be done in collaboration with the Fusion technology department at CIEMAT.

Required skills:

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- A PhD in applied mathematics or engineering related to the fields of computational mechanics, computational mathematics, optimization or statistics.
- Programming experience in scientific computing.
- Writing and communication skills (oriented towards the production of scientific articles and presentations).

Other valued skills (not mandatory):

- Advanced programming skills, e.g. distributed parallel programming, object-oriented and/or functional programming.
- Experience in finite element modelling with immersed, unfitted or embedded methods.

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:** 30%
- **Training and development:** 10%
- **Professional experience:** 20%
- **Knowledge of the Catalan language:** 5%
- **Knowledge of the English language:** 15%
- **Selective tests and interview:** 20%

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 March 5th, 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.

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