Helmholtz-Zentrum Dresden-Rossendorf e.V.

With cutting-edge research in the fields of ENERGY, HEALTH and MATTER, around 1,500 employees from more than 70 nations at Helmholtz-Zentrum Dresden-Rossendorf (HZDR) are committed to mastering the great challenges facing society today. The Institute of Fluid Dynamics conducts both fundamental and applied research in the fields of thermo-fluid dynamics and magnetohydrodynamics to enhance the sustainability, the energy efficiency, and the safety of industrial processes. The Department of Computational Fluid Dynamics is seeking a PhD Student (f/m/d) to contribute to “Experimental analysis and simulation of flow-induced vibration in gas-liquid two-phase flow”, which is one sub project in the European Training Network COMBINE, where a total of 17 PhD positions are available at the premises of 14 European institutions from academia and industry: https://euraxess.ec.europa.eu/jobs/401249.

PhD Student (f/m/d) EU MSCA-Doctorate Network COMBINE: Experimental analysis and simulation of flow-induced vibration in gas-liquid two-phase flow

City: Dresden; Starting date (earliest): 01/09/26; Duration: 36 Months;
Remuneration: Salary in accordance with the EU MSCA regulations for Doctoral Researchers; Reference number: 2026/23; Closing date: 30/04/26

Tasks

- Conduct a comprehensive literature review of state-of-the-art numerical approaches for CFD–FEM simulations, with particular emphasis on the impact of gas–liquid two-phase hydrodynamics on FSI
- Design and set up a dedicated test section for investigating FSI in bubbly gas–liquid flows with axial and radial inflow at the TOPFLOW thermal-hydraulic test facility
- Qualify ultrafast X-ray tomography for the simultaneous measurement of two-phase flow characteristics and rod vibration in a rod bundle geometry
- Perform experimental investigations under varying flow conditions and carry out a phenomenological analysis of FSI, including its dependence on phase distribution and flow velocities
- Develop new sub-models for CFD–FEM simulations of two-phase flow–induced vibrations
- Conduct coupled numerical simulations and compare structural displacements induced by single-phase and two-phase flows
- Collaborate closely with our project partners
- Participate in secondments with academic and industrial partners, including: Two months at Ghent Universitty (BE); Two months at Fluiidd company (FR); Two months at WACKER company (DE)

Your mission

The objective of this PhD project is to advance computational fluid dynamics (CFD) methods for the analysis of structural vibrations induced by two-phase flow. The research will investigate how phase distribution and flow velocities influence fluid–structure interaction (FSI) and will focus on developing novel sub-models for coupled CFD–FEM simulations.

Requirements

- Completed university studies (Master/Diploma) in the field of Mechanical Engineering, Process Engineering, Computational Science, or a related discipline
- Strong foundation in fluid mechanics, gas–liquid two-phase flows, numerical methods (FVM, FEM), and two-phase flow instrumentation
- Practical experience in programming, CFD, and FEM analyses is an advantage
- Excellent communication skills and motivation to work in an interdisciplinary and international research environment
- Willingness to travel and participate in international secondments
- Excellent written and spoken English skills

Additional information

The candidate will be registered as a doctoral student at Dresden University of Technology. The EU Mobility Rule applies. That is, the candidate must not have resided or carried out her/his main activity (work, studies, etc.) in the host country (in this case Germany) for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

What we offer

- A vibrant research environment within an open, diverse, and international team
- Multi-sectoral research and multi-national collaboration with fellows in the network
- Comprehensive network-wide and local training in technical and soft skills
- Attractive secondments at leading academic and industrial network partner institutions
- Salary in accordance with the EU MSCA regulations for Doctoral Researchers (page 118ff) (https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-2-msca-actions_horizon-2023-2024_en.pdf)
- Numerous company health management offerings
- Employee discounts with well-known providers via the platform Corporate Benefits
- An employer subsidy for the "Deutschland-Ticket Jobticket"

Application

We look forward to receiving your application documents (including cover letter, CV, diplomas/transcripts, etc.), which you can submit via our online-application-system: https://www.hzdr.de/db/Cms?pNid=490&pLang=en&pOid=76497

More information at https://stellenticket.de/203292/TUBS/
Offer visible until 30/04/26