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. 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.

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: 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; 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)

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)
- 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/201375/TUB/
Offer visible until 07/03/26