

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 is conducting basic and applied research in the fields of thermo-fluid dynamics and magnetohydrodynamics in order to improve the sustainability, the energy efficiency and the safety of industrial processes. The Department of Thermal Energy and Process Technology is looking for a

PhD Student (f/m/d) Dynamic Modeling and Experimental Analysis of Supercritical CO₂ Brayton Cycles in Waste Heat Recovery.

City: Dresden; Starting date (earliest): 01/01/27; Duration: 3 years; Remuneration: TVöD Bund; Reference number: 2026/129; Closing date: 06/11/26

Tasks

- Characterization of dynamic load profiles of carbon-intensive waste heat recovery and power generation processes
- Literature review of the state of the art in the field of dynamic operation of sCO₂ cycles
- Development and carrying out of an experimental matrix for a comprehensive study on steady-state and dynamic load behavior of sCO₂ cycles using the CARBOSOLA test facility
- Development of a dynamic model of a sCO₂ Brayton cycle based on literature and experimental results
- Simulation and optimization of the operating behavior of flexible energy systems with integrated sCO₂ cycles, including control and operating strategies
- Estimation of economic benefits of various potential control and operating strategies of sCO₂ Brayton cycles via techno-economic analyses (TEA)
- Contributions to the design recommendations and control strategies for modular sCO₂ cycles for broader implementation and economies of scale
- Scientific documentation and communication of results in the form of conference contributions and journal publications

Requirements

- Completed university studies (Master/Diploma) in the field of Process Engineering, Chemical Engineering, Mechanical Engineering or related field
- Solid knowledge of thermodynamics, heat and mass transfer phenomena, process engineering, and process technology
- Solid knowledge in process control theory (e.g., model predictive control, fuzzy control, etc.)
- Willingness to work on numerical and experimental tasks
- Excellent teamwork and communication skills in an interdisciplinary and

international research environment

- Motivation and self-discipline to carry out research independently
- Excellent command of English (spoken and written)
- Proficient programming skills (e.g., MATLAB, SIMULINK, Python, Dymola/Modelica) or other common process simulators

What we offer

- A vibrant research community in an open, diverse and international work environment
- Scientific excellence and extensive professional networking opportunities
- A structured PhD program with a comprehensive range of continuing education and networking opportunities - more information about the PhD program at the HZDR
- Salary and social benefits in accordance with the collective agreement for the public sector (TVöD-Bund) including 30 days of paid holiday leave, company pension scheme (VBL)
- Depending on the personal qualifications, the candidate may be classified in salary group 13 according to TVöD-Bund
- We support a good work-life balance with the possibility of part-time employment, mobile working and flexible working hours
- 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/!ContMan.Export.Pdf?pNid=no&pOid=78974&pContLang=en>

More information at <https://stellenticket.de/208089/TUD/>
Offer visible until 06/11/26

