Universität Bremen

ZENTRUM FÜR ANGEWANDTE RAUMFAHRTTECHNOLOGIE UND MIKROGRAVITATION

ZARM

In the project “Investigations of phase change processes of hydrogen at variable accelerations in relation to future spacecraft - cavitation, boiling, and condensation of methane and hydrogen (KASIMOFF 3)”, the Faculty 04 – Production Engineering at the University of Bremen, subject to funding approval, is seeking to fill the following position at the earliest possible date:

Research Associate (m/f/d)
(Pay Group 13 TV-L, 100% / 39,2 hours per Week)

limited until 30.06.2028 (§ 2 WissZeitVG).

Job description:

The already successfully completed projects KASIMOFF and KASIMOFF 2 were carried out to investigate phase change processes associated with the growth of a methane and hydrogen vapor bubble under reduced gravity and cryogenic conditions. The aim of the follow-up project KASIMOFF 3 is to further develop and operate an existing cryogenic test facility for ground and drop tower experiments with the help of experienced technical staff in the Multiphase Flows working group at the Center for Applied Space Technology and Microgravity (ZARM) at the University of Bremen. The scope of the test facility for ground and drop tower experiments with liquid hydrogen is to be expanded. In addition to the formation and growth of a vapor bubble (through boiling and cavitation), the shrinkage of a vapor bubble (through condensation) as a result of pressurization should also be investigated. Further development, operation, and experiments should be accompanied by numerical simulations and theoretical analyses.

In addition, the ongoing development of a cryogenic experiment on a sounding rocket is to be further continued in cooperation with the industrial partner and other project partners.

The project KASIMOFF 3 is funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and supervised by the German Space Agency at the German Aerospace Center (DLR).

Responsibilities:

- Support the development and construction of a cryogenic test facility for ground and drop tower experiments in cooperation with the technical staff of the research group.
- Conduct cryogenic experiments in the drop tower and on ground.
- Scientific evaluation of experiments.
- Perform numerical simulations of the fluid dynamic and thermodynamic processes in the experiment.
- Prepare publications on the results obtained.
- Prepare project reports.
- Present work and results at international and national conferences.
- Support the development of a sounding rocket experiment.

What you can expect:

- Independent work in an interdisciplinary team, where cooperation and mutual support are highly valued.
- Numerous opportunities to help shape this highly topical research field.
- Participation in international and national conferences.

- National and international collaborations.
- Acquisition of specialized knowledge and skills for modeling and understanding the fluid dynamic and thermodynamic processes associated with the operation of cryogenic systems.

Requirements:

- A completed scientific university degree (Master's or equivalent) in engineering, physics, or technical mathematics with very good grades.
- Basic technical understanding and the ability to work independently in a small team.
- A strong understanding of fluid dynamic and thermodynamic processes.
- Desirable: basic knowledge of Python or MATLAB programming and initial experience with a CFD tool such as FLOW3D, ANSYS Fluent, or OpenFoam.
- Very good English skills.
- Basic German skills are also desirable.

Context:

In the frame of the project KASIMOFF 3 investigations of phase change processes of hydrogen under variable accelerations shall be conducted. The hydrogen is in the liquid and gaseous phase under cryogenic conditions in a test container. Two acceleration states are investigated: terrestrial gravity (experiments on the Earth's surface) and compensated gravity (in the drop tower Bremen). These acceleration states have a fundamental influence on a two-phase system with liquid and gaseous phases. The phase change processes include the evaporation of the liquid phase as well as the condensation of the gaseous phase and are caused by changes in pressure and temperature. These changes occur during the conditioning of containers for the storage and supply of fuels in spacecraft. Hydrogen and methane are high-energy fuels that are burned with oxygen as an oxidizer in the propulsion unit. The exhaust gases are accelerated to high speeds via the rocket engine nozzle. The momentum of the exhaust gas accelerates the spacecraft. The acceleration in turn results in forces that affect the fuel in the tanks.

General Information:

Open to unconventional approaches in research and teaching, the University of Bremen has, since its founding 50 years ago, retained its character as a place of short distances for people and ideas. With a broad range of disciplines, we combine exceptional performance with great innovative potential. As an ambitious research university, we stand for the principle of research-based learning and a strong focus on interdisciplinarity. We actively and collaboratively shape scientific cooperation worldwide.

Today, around 23,000 people learn, teach, research, and work on our international campus. In research and teaching, administration, and operations, we are committed to the goals of sustainability, climate justice, and climate neutrality. Our "Bremen spirit" is expressed through the courage to break new ground, mutual support, and respect and appreciation for one another. With our study and research profile and as part of the European YUFE network, we assume social responsibility in the region, in Europe, and worldwide.

The university is family-friendly, diverse and sees itself as an international university. We therefore welcome all applicants regardless of gender, nationality, ethnic and social origin, religion/belief, disability, age, sexual orientation and identity.

As the University of Bremen intends to increase the proportion of female employees in science, women are particularly encouraged to apply. In the case of equal qualifications, women are given priority, unless reasons relating to the person of a competitor prevail.

Disabled applicants will be given priority if their professional and personal qualifications are essentially the same.

For general questions about the personnel selection procedure and for questions about the content of the advertised position, please contact: Dr.-Ing. André Pingel, andre.pingel@zarm.uni-bremen.de

Your application (motivation letter, CV, certificates, and, if applicable, list of publications) should be sent (preferably in English) stating the reference number A228-25 by September 24th, 2025 as a PDF file by unencrypted electronic mail to: andre.pingel@zarm.uni-bremen.de

or by post to:

University of Bremen
Center of Applied Space Technology and Microgravity (ZARM)
Dr.-Ing. André Pingel
Am Fallturm 2
28359 Bremen

Please note that no photos are to be attached to the application documents.

We kindly ask you to send us only copies (no portfolios) of your application documents, as we cannot return them. They will be destroyed after the selection process has been completed. Any application costs cannot be reimbursed.