Universität Bremen

ZENTRUM FÜR ANGEWANDTE RAUMFAHRTTECHNOLOGIE UND MIKROGRAVITATION

ZARM

In the project “Investigations of the Transfer and Refilling of a Spacecraft Tank with a Single-Component Two-Phase Fluid System under Compensated Gravity – Transfer and Refilling Experiment (TREX)”, the Faculty 04 – Production Engineering at the University of Bremen, 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 ZBOT-FT (Zero Boil-Off Tank Experiment – Filling and Transfer) and ZBOT-FT 2 investigated the fluid dynamic and thermodynamic processes associated with filling a tank with liquid and withdrawing liquid from a tank under reduced gravity. The aim of the follow-up project TREX is to develop and operate a test facility for ground and drop tower experiments. The experiments will investigate the fluid dynamic and thermodynamic processes during the filling of a scaled tank with storable test fluid in a single-component two-phase system under Earth gravity and microgravity. The construction, operation, and experiments will be accompanied by numerical simulations and theoretical analyses. The development and operation of the test facility is supported by the experienced technical staff in the Multiphase Flows research group at the Center of Applied Space Technology and Microgravity (ZARM) at the University of Bremen,

In addition, the development of an experiment on the International Space Station will continue in cooperation with the industrial partner and NASA Glenn Research Center when the next project phase begins.

The project TREX 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 test facility for ground and drop tower experiments in cooperation with the technical staff of the research group.
- Conduct 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 an experiment on the International Space Station.

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 involved in operating an orbital propellant depot.

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:

Future crewed exploration missions are not possible without propellant depots in space. Previous missions carried all propellant from Earth's surface, requiring ever more powerful launch vehicles. Currently, the most powerful rocket is the booster of the Starship. However, the amount of propellant needed for a crewed mission to Mars far exceeds the capacity of current upper stages.

A propellant depot is launched empty or partially filled from Earth and transported to its target orbit. In the target orbit, the empty or partially filled depot is refueled by propellant tankers to the desired fill level. After a waiting period, an exploration spacecraft can then be fueled.

Designing the depot requires knowledge of all mission phases. The fluid dynamic and thermodynamic processes during these phases must be understood and predicted using suitable methods (CFD – Computational Fluid Dynamics). Experiment data under reduced gravity (for example on the International Space Station (ISS) or during a drop tower experiment) are essential.

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 A227-25 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.