

The **MARUM** - Center for Marine Environmental Sciences - at the **UNIVERSITY OF BREMEN** is offering – pending approval of external funding - a

PhD position (f/m/d)
German federal salary scale 13 TV-L (100 %)

in the field of physical oceanography, **starting at July 1, 2024**, limited for the duration of **48 months**, until 30.06.2028 at the longest (according to § 2 WissZeitVG).

The position is funded under the DFG Collaborative Research Centre TRR 181 “Energy Transfers in Atmosphere and Ocean”, project T5 „Gravity wave genesis, break-up and dissipation“.

Description

Energetic inconsistencies in present climate models feature errors of the same magnitude as the energy imbalance of Earth's climate system due to anthropogenic greenhouse gas emissions. This leads to biases that limit the models' ability to predict climate relevant physical processes. The collaborative research centre TRR 181 “Energy Transfers in Atmosphere and Ocean” aims to address these shortcomings by deepening the physical understanding of energy transfers between the main dynamical regimes, i.e., geostrophic motions, gravity waves, and turbulence.

Understanding and representing the effects of gravity waves (GWs) in weather and climate models, remains an order-of-one challenge, with important implications for the representation of energy and momentum transport in the atmosphere. In subproject T5 we aim to determine the dependence of GW break-up, dissipation and secondary emission on the source and environment to pave the way for accurate parametrisations of these processes. You will research the instability and breakup of GW via nonlinear mechanisms. Based upon existing code to efficiently solve the Navier—Stokes equations you will develop your own codes to compute optimal disturbances to GW. You will explore the dependence of the optimal disturbances on density gradients and wind shear and will quantify the energy dissipated by the breakup.

We are searching for researchers with a keen interest in in theory and numerical simulation. The position will be located at the ZARM of the University of Bremen under the supervision of Prof. Marc Avila. The following tasks are specifically located in the position:

- Development of spectral numerical solvers for the direct numerical simulation of GW (based on existing solvers)
- Development of optimization methods for calculating optimal disturbances to GW
- Performing numerical simulations of GW instabilities
- Determination of optimal disturbances
- Analysis of instability mechanisms and turbulence transition

The project will be carried out in close collaboration with Prof. Juan Pedro Mellado (University of Hamburg). We offer you the opportunity to work in cutting-edge fluid mechanics research in an interdisciplinary international team in the vibrant city of Bremen in northern Germany, also within the TRR network. As a doctoral researcher, you will be part of the TRR Research Training Group ENERGY, spread across Germany's leading oceanographic research sites.

Requirements

- Completed scientific university studies (Master's degree/university diploma) in mechanical or aerospace engineering, physics, applied mathematics or closely related fields
- Demonstrated skills in scientific computer programming (e.g. python, C, Fortran or similar)
- Solid background in fluid mechanics and in numerical methods for partial differential equations
- Experience in numerical optimization is advantageous
- Excellent written and verbal communication skills
- Applicants should be proficient in English, and enjoy working in an international and interdisciplinary team

General hints

MARUM (www.marum.de) has developed into an internationally recognised centre for marine research with a focus on the geosciences, anchored at the University of Bremen.

Open to unconventional approaches in research and teaching, the University of Bremen has retained its character as a place of short distances for people and ideas since its founding in 1971. With a broad range of subjects, we combine exceptional performance and innovative potential. As an ambitious research university, we stand for research-based learning approaches and a pronounced interdisciplinary orientation. We actively pursue international scientific cooperation in a spirit of global partnership.

Today, around 23,000 people learn, teach, research and work on our international campus. In research and teaching, administration and operations, we are firmly committed to the goals of sustainability, climate justice and climate neutrality. Our Bremen spirit is expressed in the courage to dare new things, in supportive cooperation, in respect and appreciation for each other. With our study and research profile and as part of the European YUFE network, we assume social responsibility in the region, in Europe and in the world.

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.

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

For more information on the position, please contact Prof. Marc Avila (mavila@uni-bremen.de). Applicants should submit following documents: CV, copies of diplomas, letter of motivation and names of at least two references with reference to **job advertisement number A182-24** by **May 31, 2024** to

Maria Petrogiannis
ZARM
University of Bremen
Am Fallturm
28359 Bremen
Germany

or as a single PDF file by e-mail to bewerbung-a18224@marum.de.

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.