

PhD position: Effect of real roughness on thermal convection

Job description

Are you fascinated by physics and interested in developing of state-of-the-art fluid dynamics computer simulations to better understand real world problems? Are you ambitious and dynamic? Do you strive for excellence? We are looking for a PhD student to carry out state-of-the-art research on turbulent convection. Thermal convection plays a crucial role in natural and industrial settings, from astrophysical and geophysical flows to process engineering. Roughness is omnipresent in nature, e.g. vegetation canopies with respect to atmospheric flows, and many engineering applications need to deal with rough boundaries. The paradigmatic representation of thermal convection is Rayleigh–Bénard flow; a layer of fluid heated from below and cooled from above. So far thermal convection has mainly been studied in idealized cases and most studies on the effect of roughness have focused on idealized roughness patterns, which may trigger specific flow patterns. To overcome this limitation, you will study heat transfer in turbulent flows over random sand grain roughness patterns using high-fidelity numerical simulations. Such simulations are an ideal tool to improve our fundamental insight of these flows since simulations allow us to visualize the flow and study important physical effects under controlled and reproducible conditions. In this PhD project, funded by an ERC starting grant, you will further develop and use state-of-the-art direct numerical simulations to figure out what physical mechanisms determine what surface characteristics influence the heat transport in turbulent flow over rough plates. The goal of your project is to find roughness patterns that will make the flow in the boundary layers fully turbulent and hence trigger the so-called ultimate regime of thermal convection.

Location

You will work in the Physics of Fluids group at the University of Twente (UT) in the Netherlands. The research in our group covers a variety of aspects in fluid mechanics. Our group focuses on understanding fundamental fluid physics phenomena using experiments, simulations, and theory. Our group is embedded in the Twente Max Planck Center, the J.M. Burgers Research Center for fluid mechanics, and the MESA+ and MIRA Institutes. Our group has access to several top supercomputers in Europe and the US. For further information, you are encouraged to look at <https://stevensrjam.github.io/Website/> and <http://pof.tnw.utwente.nl> to read our recent publications on the topic.

Your profile

You have a background in applied physics or mechanical engineering or a closely related subject area. You have strong communication skills, including fluency in written and spoken English. You are enthusiastic and highly motivated to do a Ph.D. Programming experience in C or Fortran is a plus.

Our offer

We want you to play a key role in an ambitious project in an inspiring and stimulating international work environment.

- We provide excellent mentorship and a stimulating, state-of-the-art research environment with world-class research facilities.
- You will have an employment contract for 4 years and can participate in all employee benefits the UT offers.
- You are an excellent teammate in an enthusiastic and hardworking group of scientists.
- You can make use of excellent facilities for professional and personal development.
- You will follow a high-quality personalized educational program.
- The research will result in a Ph.D. thesis at the end of the employment period.
- We strive for diversity and fairness in hiring.

How to apply

Potential applicants are encouraged to apply to Dr. Richard Stevens (r.j.a.m.stevens@utwente.nl).

Applications should include the following documents:

- A motivation letter describing why you want to apply for this position.
- Description of your research interests.
- A detailed CV.
- Academic transcripts from your Bachelor's and Master's degrees.
- Email addresses of at least two references who are willing to send a letter of recommendation on your behalf.
- An interview with a scientific presentation will be part of the interview process.

We are an equal opportunity employer and value diversity at our university. We are committed to enhancing and sustaining diversity in the composition of our staff. We do not discriminate on the basis of race, religion, color, national origin, gender, sexual orientation, age, marital status, veteran status, or disability status. We will ensure that individuals with disabilities are provided reasonable accommodation to participate in the job application or interview process, to perform essential job functions, and to receive other benefits and privileges of employment.