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NATURE 4 NATURE

Doctoral Candidate (DC5): Computational simulation of the hydrodynamics of crossflow filtration in biological systems and optimisation of bioinspired designs

Host Institution: Hochschule Bremen, Germany

Secondments: Rijksuniversiteit Groningen, The Netherlands (RUG; 3 months)

Mpacts, Belgium (8 months)

About Nature4Nature

Bioinspiration (including biomimetics and biomimicry) develops novel materials, devices, and applications inspired by biological structures and strategies. However, the main obstacle preventing this field from achieving its goals derives from differences in tools, practices and viewpoints of its practitioners. The EU-funded Nature4Nature project brings biologists, engineers, designers and manufacturers together to deliver early-stage researchers (ESRs) teaching in a learning environment that connects the inspiration, integration and implementation aspects of the bioinspiration process to undertake the conceptual, methodological and practical challenges. To do so, the project will collectively focus on biological filtration mechanisms to explore, test and design high-throughput, clog-resisting filtration systems, which could ultimately alleviate the current problems facing aquatic environments.

Hochschule Bremen

The City University of Applied Sciences Bremen (HSB) with around 600 employees was the first university worldwide which offers academic studies in biomimetic (BSc, MSc). The Bionics-Innovation-Centre of HSB has around 20 employees and is engaged in the identification and investigation of physical phenomena in nature and transfer of the latter to technical applications. Current and previous research projects were funded by public institutions and by industry. Focal points are locomotion, construction and materials. In the first domain, flows over and in bodies are of special interest. Here, research is carried out in the fields of functional surfaces (reduction of frictional drag, poison-free anti-fouling flows), shape design of bodies (reduction of drag, lift enhancement, manoeuvrability). Investigations are carried out by numerical simulation using different codes and by experiments.

Project description

This project within Nature4Nature focus on the fluid mechanical characterisation and optimisation of biological inspired high-throughput, clog-resisting filtration systems using Computational Fluid Dynamics (CFD) in cooperation with Mpacts/Belgium. The filter models are taken from vertebrates (birds, fishes). The flow analysis includes the efficiency of particle separation, residence times, pressure drop and energy balances. CFD results are compared to experimental data from the Biomimetics Group of the Energy and Sustainability Research Institute Groningen of the University of Groningen/The Netherlands. The development/optimisation of the filter geometry and the determination of process parameters towards a technical application of the filter take place in close cooperation with the interdisciplinary and international team of Nature4Nature.

Your area of responsibility

- Numerical simulation of one and two phase flows in filter systems using different CFD codes including extension and adaptation of CFD codes
- Publication of project results in scientific journals and at conferences
- Collaboration and communication with project partners
- Preparation, participation and follow-up of project meetings
- Preparation of project reports and participation in administration of the project

Profile & requirements

- Applicants must have completed academic university studies (MSc, MEng) with a specialization in CFD, physics, engineering or similar fields of study
- Applicants should have experience in the use of CFD codes and programming (C++, Python)
- Transcripts of the master's degree must be available by the date of the recruitment
- Applicants should have a strong affinity for research and be result orientated

- The candidate should display an analytical view of complex contexts
- Applicants should be willing to work independently but also display teamwork skills
- Applicants may be of any nationality but must comply with the Horizon Europe MSCA eligibility criteria*
- Applicants must be able to understand and express themselves in both written and spoken English to a level that is sufficient for the completion of a PhD
- All qualified applicants, including minorities and woman, are encouraged to apply

* **HORIZON MSCA Mobility Rule:** Applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of the host organization (Germany) for more than 12 months in the past 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status are not taken into account.

* **HORIZON MSCA eligibility criteria:** Applicants may not hold a doctoral degree or equivalent at the start date of the recruitment. Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will not be considered eligible.

Benefits

- The selected candidate will be employed by the host organisation for **36 months**
- **The start date will be as of September 1st, 2023**
- The opportunity to be part of an MSCA Doctoral Network: the selected candidate will benefit from the designed training programme offered by the host organisation and the Nature4Nature consortium.
- The selected candidate will participate in international secondments to other organisations within the Nature4Nature network.
- Doctoral candidates are offered a competitive remuneration in line with the MSCA Doctoral Networks salary scale (see PDF on website), and consists of a monthly *Living Allowance*, *Mobility Allowance* and *Family Allowance* (if applicable).
- Costs associated with the network and training events are to be covered by the host institution.

Application

- Interested candidates are invited to apply for this position: <https://career.hs-bremen.de/jobposting/95bfc014147da735cabdf9300f6928b66293ba6d0>
- The closing date for applications is **February 24th, 2023**.
- The selection committee will review all the applications upon the application deadline.
- The recruitment process of Nature4Nature is in line with the principles set out in the [European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers](#).
- Ukrainian researchers are eligible to benefit from the Science4Refugees initiative without the need of holding the refugee status.

Additional information

- For more information on the Nature4Nature consortium, please visit our website at <https://www.nature4nature.net/>
- Any additional questions can be directed to the project manager, Genevieve Diedericks, at Genevieve.Diedericks@uantwerpen.be

