UNIVERSITÄT BAYREUTH

Biofluid Simulation and Modeling
Theoretische Physik VI

PhD Project

Microplastic contamination of the atmosphere studied by computer simulation

Contamination by microscopic plastic particles has become one of the foremost emerging issues for the global environment. In that respect, the University of Bayreuth plans to establish a new center for microplastic research. This interdisciplinary center is to involve more than 20 research groups to study the creation, the biological effects and the transport of microplastic in the environment.

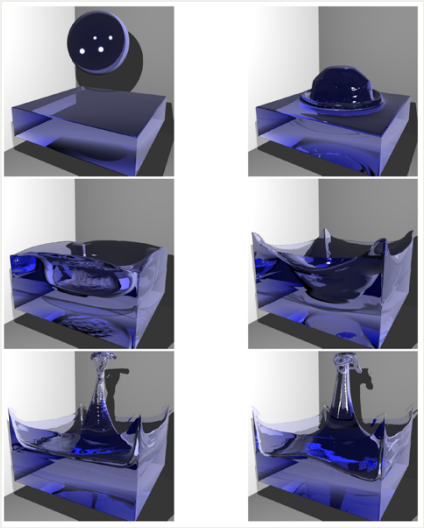

Fig. 1: Lattice-Boltzmann simulation of an impact drop (T. Pohl, PhD thesis)

The present project deals with the transport of microplastic particles from oceans, lakes or rivers to the atmosphere by bursting gas bubbles or impacting rain drops. The bursting of a bubble or the impact of a rain drop on water produces about 100 microdroplets which are ejected at high speeds into the atmosphere. It is known that these microdroplets transport between 10^{12} and 10^{14} kg salt per year into the atmosphere. It is the goal of the advertised PhD project to understand if and how the ejected microdroplets can act as vehicles in a similar way also for microplastic particles.

The PhD project is situated in the Theoretical Physics department and will heavily use methods of computational fluid dynamics such as Lattice-Boltzmann, Immersed-Boundary and Volume-of-Fluid. Due to the large separation of length scales, the project is very challenging from a numerical point of view. Roughly one third of the project will be concerned with developing an appropriate simulation code in C++. In the remaining two thirds, the student will carry out large-scale simulations on local, national and European supercomputer facilities. The study will involve a close collaboration with our experimental partner group led by Andreas Held at TU Berlin.

The required supercomputer ressources will be provided by the local computing cluster available at the University of Bayreuth as well as by projects on national supercomputing systems such as SuperMUC (Garching) and JEWELS (Jülich).

The successful candidate must possess a strong background in theoretical physics, numerical mathematics, computational engineering or a similar discipline. Very good programming skills in C++ are required. A background in fluid mechanics is desirable, but not explicitly required. Research will be conducted in the Biofluid Simulation and Modeling group at the University of Bayreuth, Germany. Bayreuth is a medium-sized town with a fairly large student population and is situated in a beautiful natural setting between the mountains of the "Fränkische Schweiz" and "Fichtelgebirge".

For applications or further information please contact *stephan.gekle@uni-bayreuth.de* or see our website *biofluid.physik.uni-bayreuth.de*