Elitenetzwerk Bayern

Einblicke in die Forschungsarbeit

**MASTER THESIS**

# “Simulation of a UV-Light Air Purifier”

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# Simulation of a UV-Light Air Purifier

Within the Bavarian Graduate School of Computational Engineering I had the possibility to do a research internship at CERFACS in Toulouse. Goal of the internship was to develop a simulation of the air flow through a UV-light air filter which is used to fight the spread of viruses.

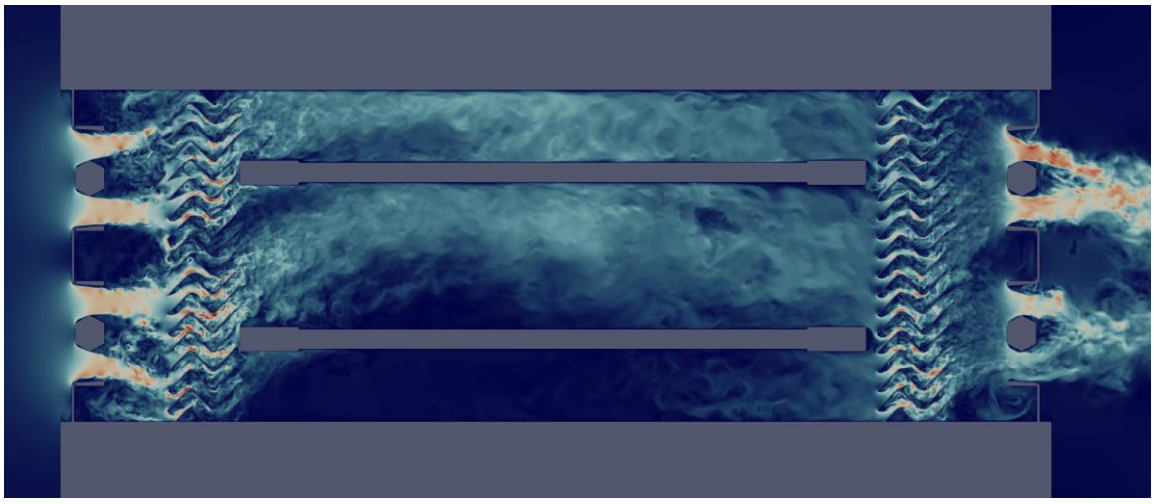
## Airborne Virus Transmission

Although it was unclear at the beginning of the COVID pandemic, the scientific community now agrees that the air plays a significant role in the transmission of SARS-CoV-2. Considering that this is the case for others viruses, too, researchers and engineers try to use particulate or UV-light air filters to reduce the airborne viral load, especially in public spaces. Developers of such devices strive to maximize the amount of filtered air and efficiency of the filtration while minimizing the emission of unwanted noise.

## Simulation of Air Filters

To achieve an optimal balance of these conflicting goals, simulations are an indispensable tool. They help to understand how air flows through these devices and allow to rapidly analyze digital prototypes. As a member of the elite study program of the Bavarian Graduate School of Computational Engineering I spent eight weeks at CERFACS in Toulouse to work on a simulation of the flow through a UV-light air filter. CERFACS is among the leading research institutions in modeling and numerical simulation. Concretely, my task was to employ the software waLBerla, which is developed in Erlangen, to realize a Lattice-Boltzmann simulation of the air flow.

The scientists at CERFACS want to compare the results with their in-house Finite-Volume solver to gain more insights into the applicability of the relatively new Lattice-Boltzmann method.



The velocity field of the air in the purifier. Visible are the UV-light tubes and fins to direct the air flow.
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