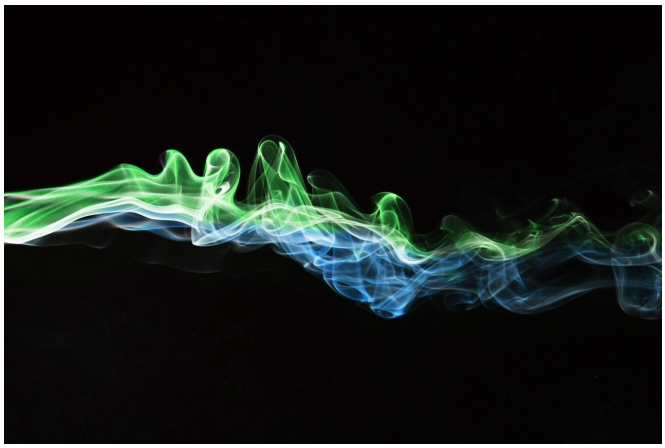
A new program models airflows much faster than before, without a supercomputer

5 November 2021



Credit: Pixabay/CC0 Public Domain

Modeling reveals that even rooms with efficient ventilation often have areas where the air is stagnant. Assistant Professor Ville Vuorinen believes that a new program could become a tool that can be used by both researchers as well as experts responsible for planning of public spaces.

Aalto University Assistant Professor Ville Vuorinen and his colleagues have been developing a program for more than a year which could be used for modeling flows of indoor air more easily and more quickly. The project was granted special funding from the Academy of Finland earmarked for COVID-19 research.

Open code software comprising about 1,000 lines of code is now nearing completion. The program has been implemented to enable the most challenging types of modeling in three days.

"For typical flow simulation software, even a supercomputer could easily use ten times as much time on the same task", says Vuorinen, who has been working on modeling using a supercomputer during the coronavirus epidemic.

"Using our software only requires a desktop computer and an efficient graphics card—the kind that is familiar from the world of gaming which draws graphics on the display, and which costs about 2,000 euros."

Known—but not recognized

When a person breathes, sings, and speaks, carbon dioxide and aerosols are released into the air from the airways. The small particles can carry coronaviruses and other pathogens. Air change reduces carbon dioxide content as well as the number of aerosols in the air.

The new program can be used for modeling the effects of air change systems, ventilation, people, walls, and furniture on indoor air flows and the carbon dioxide content of spaces. The lighter the shade of the airflow shown in the model, the lower the carbon dioxide content, and the fresher the air becomes—with fewer pathogen-carrying aerosol particles.

"The models are good at showing how easily black shadow areas with stuffy air can appear in a room. On one side of a screen the air can be fresh, and on the other side carbon dioxide content can be very high", Vuorinen says.

"This has certainly been known before, but it has not been adequately recognized."

The program was implemented using MATLAB, and it is expected to be released in early December. Vuorinen expects that the software will initially be used primarily by researchers. Later the aim is to develop the software so that it can also be utilized by experts in the design of indoor spaces, for example.

Provided by Aalto University

APA citation: A new program models airflows much faster than before, without a supercomputer (2021, November 5) retrieved 23 January 2022 from https://techxplore.com/news/2021-11-airflows-faster-supercomputer.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.