# Prediction and Countermeasure for Virus Droplet Infection under the Indoor Environment

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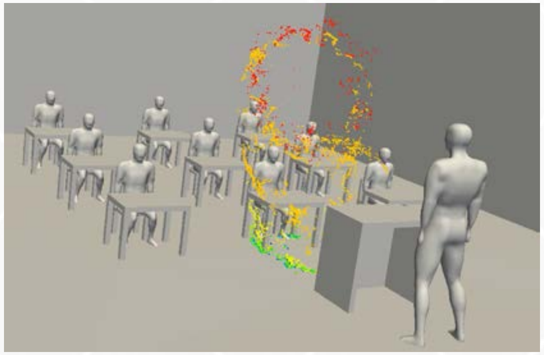
**Outline of the Research:**

Virus droplet infection caused by sneezing, coughing, or talking is strongly influenced by the flow, temperature and humidity of the air around an infected person and potential victims. Especially in the case of the new coronavirus, possibility of aerosol infection by atomized droplets is suggested in addition to the usual droplet infection. Because smaller aerosol particles drift in the air for a longer time, it is imperative to predict the scattering route and to estimate how surrounding airflow affects the infection so that the risk of droplet infection can be properly assessed, and effective measures to reduce infection can be proposed. In this project, massively parallel coupling simulation of virus droplet scattering, with airflow and heat transfer under the indoor environment such as inside a commuter train, offices, classrooms, and hospital rooms will be conducted. By taking into account the characteristics of the virus, its infection risk of virus droplets is assessed under various conditions. Then countermeasures to reduce the risk are proposed from a viewpoint of controlling the air flow.

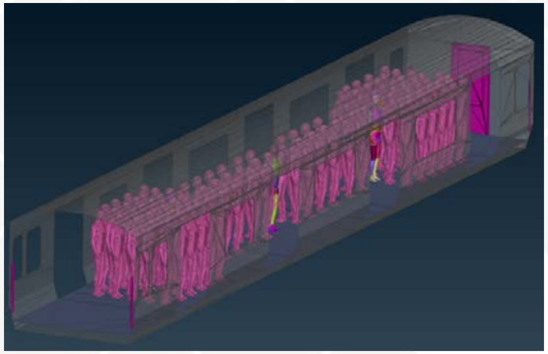
This project is a collaboration with RIKEN, Kyoto Institute of Technology, Kobe University, Osaka University, Toyohashi University of Technology, and Kajima Corporation. Complex Unified Simulation framework called CUBE, developed at RIKEN R-CCS and implemented on the supercomputer Fugaku, is mainly used, which will be the world-largest and highly accurate virus droplet simulation ever conducted.



An Example of virus droplet simulation in a classroom (By prof. Yamakawa of Kyoto Institute of Technology)

**Expected Achievements:**

The risk of droplet infection under the indoor environment is quantitatively evaluated, and specific countermeasures to reduce the infection risk is proposed in terms of effective ways of opening/closing windows, use of air conditioning, and placement of partitions. In addition, by creating animation of the droplet scattering and its spreading speed in the rooms from the simulation results, people can visually understand the risk of droplet infection and its countermeasures. These outputs from the simulation can protect the living and working environment from virus droplet infection, and contribute to earlier recovery of the socio-economic activities.



Simulation model of a cabin of a commuter train