KAJIMA KAJIMA TECHNICAL RESEARCH INSTITUTE

Fugaku COVID-19 Countermeasure Project Droplet Infection Team

Wins Gordon Bell Special Prize

The COVID-19 countermeasure project in which Kajima is participating, “Digital transformation of droplet/aerosol infection risk assessment realized on “Fugaku” for the fight against COVID-19” (led by Professor Tsubokura, RIKEN/Kobe University) using the supercomputer Fugaku, was awarded the 2021 ACMGordon Bell Special Prize for COVID-19 Research. The Gordon Bell Prize, one of the most prestigious awards in computational science, is awarded to the research team with the year’s most outstanding achievement in the application of large-scale computing using supercomputers to research in science and engineering. Beginning in the previous year, a special prize related to COVID-19 research was created to recognize research contributing to a resolution of the global crisis and an understanding of the pandemic through the use of supercomputers. As the only construction company taking part in this project, Kajima is contributing to the simulations using supercomputer Fugaku by providing its unique expertise in built-environment simulations, creating computational models, providing advice on the evaluation of infection risk, and more.

Kajima’s Role

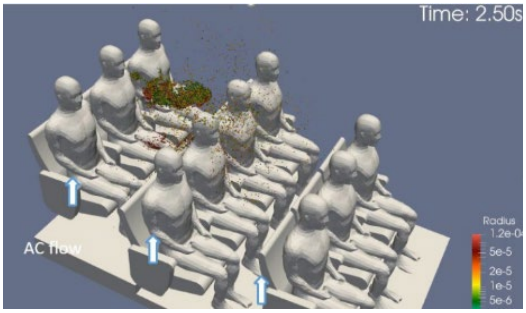
In response to the spread of infectious diseases, beginning with SARS in 2002, Kajima began research and development into droplet simulations in various built-environments in 2011. Using these simulation technologies with our high-performance computing server and experimental visualization facility, we are increasing our expertise in architectural and facility planning to address infectious disease transmission. By leveraging this, we created various calculation models for indoor environments, verified indoor environmental simulations such as boundary condition settings and their results, and proposed measures to reduce the risk of infection.

KaTRIS – National University of Singapore Joint Research

In addition, joint research between KaTRIS (Kajima Technical Research Institute Singapore, the Singapore office of Kajima Technical Research Institute) and Assistant Professor Adrian Chong of the National University of Singapore used supercomputer Fugaku to simulate and evaluate the effects of droplets near an infected person (source) in a room equipped with a ceiling fan. This was built on KaTRIS and the National University of Singapore’s joint research into the effect of ceiling fans, which has a possibility of reducing COVID-19 infection risk and was further developed as part of the Fugaku project.

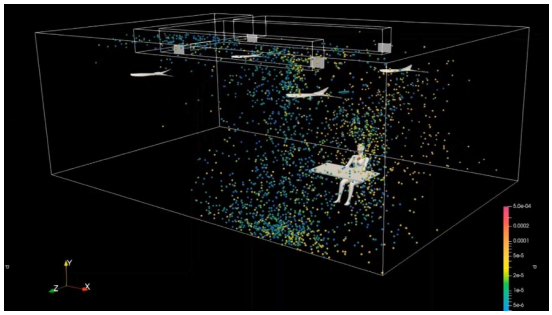
Results from experiments conducted at NUS SDE4 and the airflow simulations show that ceiling fans provide a vertical airflow that rapidly mitigates droplet spread immediately after the generation. This effect allows the ceiling fan to significantly reduce the amount of droplets reaching a person seated opposite the source, which are considered to have a high infection risk. This research provides further understanding of the dispersion mechanism of infectious droplets that led to the receipt of the award.

Kajima will continue to contribute to efforts to take on the societal challenge of stopping the spread of infection through its participation in the Fugaku project. We will also leverage the new knowledge we acquire through these activities to support future efforts to reduce and prevent infection.



Droplet simulation in a theater

Source: RIKEN and Kobe University
in cooperation with Toyohashi University of Technology,
Kyoto Institute of Technology, and Kajima Corporation



Droplet simulation with ceiling fans
(Kajima and National University of Singapore
joint research)

Related Links

ACM Press Release:	https://www.acm.org/media-center/2021/november/gordon-bell-special-prize-covid-research-2021
KaTRIS Website:	https://www.kajima.co.jp/english/tech/katris/topics/index.html