Case Study

Air Purification in a Room

Study on the positioning of an air purifier device to enhance air quality uniformity in a room

Room ventilation and air purification became a hot topic in recent years due to the COVID-19 pandemic. Air purifiers can remove small particles and kill airborne viruses and bacteria, significantly improving the air quality within environments with poor ventilation.

Portable devices, however, tend to have a localised effect in a room, with some regions highly affected by its forced ventilation while others remain with stagnant and poorer quality air.

Within this study, we used passive scalars to track the concentration of purified air in the room. The model allowed us to evaluate the air quality uniformity within the space and highlight areas of poor circulation. We were also able to evaluate the sensitivities to the device operating conditions and to other external factors.

Two animations illustrate the approach taken. **Video 1** shows the fraction of purified air in the room over time, while **Video 2** shows the opposite, the fraction of unpurified air and is more suitable for visualising the areas with poorer flow quality.

This case study highlights an application with a relatively simple modelling approach, but which provided a valuable insight into the background application. Sabe Fluid Dynamics has many years of experience working with systems which are affected by multiple variables and operating conditions. We support our clients with assessments on the best way to address their challenges and we deliver fit for purpose solutions. Contact us to discuss your challenge!

Summary

Background Application:
Air purification inside a room.

Engineering Challenges:
Investigation of the effect of the air purifier position and operation conditions with the objective of minimising regions with low air circulation.

Our Experience:
Sabe Fluid Dynamics has many years of experience working with complex systems which are affected by multiple variables and operating conditions. We support our clients with assessments on the best way to address their challenges and we deliver fit for purpose solutions.

Video link:
Video 1– Fraction of Purified Air in the Room
Video 2– Fraction of Unpurified Air in the Room