# 3D indoor air purifier flow reconstruction using PIV snapshot optimisation

Ali Rahimi Khojasteh, Philippe Georgeault, Dominique Heitz, Lionel Fiabane, Vincent Raimbaud, Jérôme Migaud

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# 3D indoor air purifier flow reconstruction using PIV snapshot optimisation

Ali RAHIMI KHOJASTEH[1], Philippe GEORGEAULT[1], Dominique HEITZ[1], Lionel FIABANE[1], Vincent RAIMBAUD[2], Jérôme MIGAUD[2]

[1]INRAE, UR OPAALE, Rennes, France

ali.rahimi-khojasteh@inrae.fr

[2]MANN+HUMMEL, Laval, France

**ABSTRACT :**

The recent studies showed that purifying large volume flow with high-quality filters can reduce the risk of indirect infections for local indoor activities in the SARS-CoV-2 pandemic situation [1]. This study aims to have a large-scale measurement of the indoor air purifier with the volume flow rate up to 1500 $m^3/h$ using stereo PIV measurements and reconstructing the volumetric domain by snapshot optimisation [2] instead of performing large scale volumetric measurements such as Tomo-PIV or 4D-PTV. Therefore, we designed four stereo PIV measurements in different depth with an assumption of homogeneity in between. The test model was set in a room with nearly $8\ m^3$ volume. An additional time-resolved measurement is required in the main circulation direction perpendicular to the other four measurements. Volumetric measurements are highly limited by cameras' depth of focus problem in large-scale measurements. In this study, we investigate the challenges and flow behaviours of using indoor air purifiers. Due to the flow dynamics, the particle residence time (PET) can be comparably higher for some specific regions inside the room, increasing the infection risk by bioaerosols. Having a volumetric flow reconstruction can provide valuable information about the existence of recirculation regions while using the air purifier in different locations and how to decrease their resistance time. To rotate the measurement setup in different locations, we designed and prepared portable cameras and LED mounts, as shown in Figure 1.a. We performed pre-testing of the calibration setup as shown in Figure 1.b. We expect to finish the measurements and provide results within 2-3 months.

a) b)

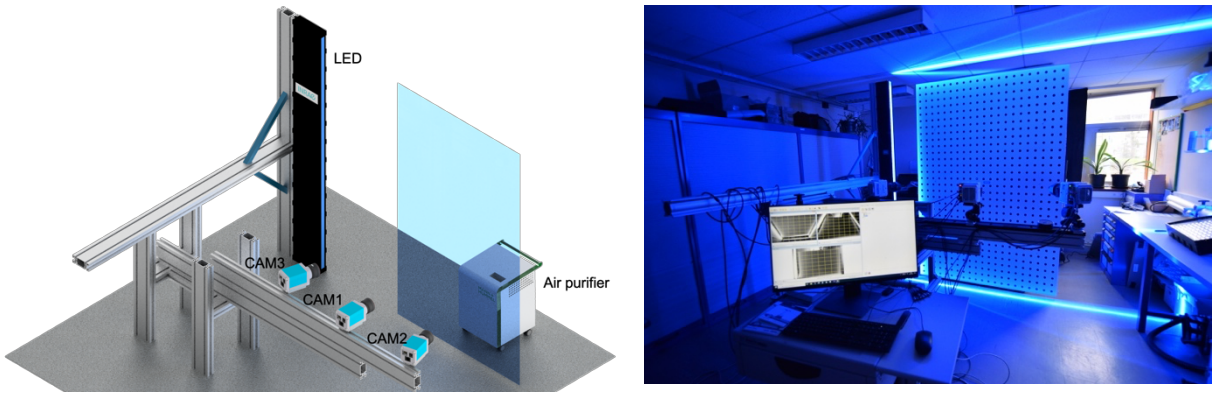


Figure 1 Air purifier flow measurement: a) Schematic view of one stereo measurement for upstream flow field; b) Calibration setup test.

**REFERENCES:**

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