Ventilation and Airflow Analysis in MFHT Room at IIT Bombay: Impact of Exhaust and AC, Comparison with Dual Exhaust Configuration

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Abstract

This study investigates the significance of Air Changes per Hour (ACH) in understanding and managing indoor air quality. The focus lies on monitoring and optimizing ACH to ensure adequate ventilation, maintain indoor air quality, reduce the risk of disease transmission, and improve the well-being, comfort, and productivity of indoor occupants. The study analyses air residence time in a room equipped with one exhaust, one inlet (acting as a door), and one air conditioner. Through approximately 25 simulations with a fixed exhaust height and varying horizontal positions, the aim is to determine air residence time at two heights: 1.3 meters and 1.6 meters, corresponding to seated and standing individuals, respectively. The objective is to minimize air residence time by optimizing exhaust placement. Results indicate that residence time decreases further with two exhausts. Additionally, a machine learning algorithm achieves 92.16% and 86.10% accuracy in predicting air residence time at 1.6 meters and 1.3 meters, respectively, based on simulation data.

References

Sinha, K., Yadav, M. S., Verma, U., Murallidharan, J. S., & Kumar, V. (2021). Effect of recirculation zones on the ventilation of a public washroom. *Physics of Fluids*, *33*(11).