Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Airflows inside passenger cars and implications for airborne disease transmission KENNETH BREUER, ASIMANSHU DAS, Center for Fluid Mechanics, Brown University, JEFFREY BAILEY, Dept of Pathology and Laboratory Medicine, Brown University, VARGHESE MATHAI, Center for Fluid Mechanics, Brown University — Transmission of highly infectious respiratory diseases, including SARS-CoV-2 are facilitated by the transport of tiny droplets and aerosols (harboring viruses, bacteria, etc.) that are breathed out by individuals and can remain suspended in air for extended periods of time in confined environments. A passenger car cabin represents one such situation in which there exists an elevated risk of pathogen transmission. Here we present results from numerical simulations of the potential routes of airborne transmission within a model car geometry, for a variety of ventilation configurations representing different combinations of open and closed windows. We estimate relative concentrations and residence times of a non-interacting, passive scalar a proxy for infectious pathogenic particles that are advected and diffused by the turbulent airflows inside the cabin. Our findings reveal that creating an airflow pattern that travels across the cabin, entering and existing farthest from the occupants can potentially reduce the transmission.

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Date submitted: 02 Aug 2020 Electronic form version 1.4