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Role of Pulsatility on Aerosol Dispersion in Expiratory Flows KALVIN MONROE, AARON LATTANZI, YUAN YAO, University of Michigan, VRISHANK RAGHAV, Auburn University, JESSE CAPECELATRO, University of Michigan, VRISHANK RAGHAV COLLABORATION, CAPECELATRO RESEARCH GROUP TEAM — With an expected second wave of COVID 19 in the near future, there is an immediate need to develop a better understanding of factors contributing to dispersion of contagion carrying droplets during expiratory events. Although single-pulse expiratory events have been widely studied in the past, this work seeks to quantify the effects of pulsatility (multiple expulsions during a single event) on the underlying flow physics. We hypothesize that a pulsatile jet (mimicking for example a real cough or continuous speech) could increase entrainment and carry droplets farther than a single puff of turbulent jet due to vortex-vortex interactions. In this talk, direct numerical simulations (DNS) of turbulent pulsatile jets coupled with Lagrangian particle tracking of micron-sized droplets will be presented to investigate the role of secondary and tertiary expulsions on aerosol dispersion. Flow developing in the trachea is first approximated by DNS of a fully-developed turbulent pipe flow laden with 10-micron droplets and then utilized as an inflow boundary condition when examining pulsatility. The volumetric flowrate of the incoming turbulence is modulated according to a damped sine wave that controls the number of pulses, its duration, and peak amplitude.

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