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COVID-19 Transmission Dynamics: Trajectories of Virus-Laden Droplet Population Flow Model of Coughing and Sneezing YASSER ABOELKASSEM, San Diego State University, HAITHEM TAHA, University of California Irvine, HAITHEM COLLABORATION — Transmission of severe acute respiratory syndrome coronavirus (COVID-19) is mainly through virus-laden multiscale population of droplets and aerosols. These expiratory fluid particles can spread between infectious and susceptible individuals during coughing and sneezing, causing deadly respiratory illness. Healthcare authorities are searching for effective metric guidelines to minimally prevent community transmission of this virus. In this study, a mathematical model is developed to study the trajectories of fluid particles induced by a puff (momentum driven flow) of coughing/sneezing in a quiescent environment. Initially, the fluid particles are sampled from a population source of various sizes and velocities. The effects of gravitational, buoyancy, drag and deformation forces on the particles trajectories are considered. The results are validated using a mesh-free Lagrangian numerical technique, namely the smoothed-particle hydrodynamics (SPH) method.

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