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Modeling Droplet Breakup of Viscoelastic Fluids for Mitigation of Viral Particulate Transmission CAROLINE ANDERSON, DOUGLAS H. FONTES, MICHAEL KINZEL, University of Central Florida — With infectious disease spread of current global concern, computational modeling of biological fluids provides prediction of viral particulate spread. Nasal and buccal ejected mucus can reach jet velocities up to 100 mph and expel large quantities of droplets at a wide range of diameters. Smaller diameter droplets are subject to escape ejection jet and continue upwards, becoming airborne. A novel approach of altering human saliva viscosity aims to alter droplet properties such that breakup into smaller droplets, thus, limiting dispersion and reducing transmission. This computational of a single droplet subject to relative velocities of a sneezing or coughing jet provides chronological visual of droplet form in time as it leaves the facial cavities and travels out and down. Designs of various saliva viscosity and surface tension values map the droplet breakup forms across ranges of Weber number, a ratio of inertial forces acting on the droplet's surface tension, and of Ohnesorge number, which evaluates the impact of viscosity in that breakup. This map is compared to droplet-scale simulation of a viscoelastic fluid model within the drop fluid's equation of state. The rheology of the fluid is determined based on local shear rate, fluid stress tensor, and relaxation time between short-time reaction akin to solid, and following reaction like fluid. The droplet breakup view provides limits for which fluid viscosity and surface tension properties can be altered to prevent or delay secondary breakup forms into smaller droplets and reduce range of viral particle spread.

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