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Gravitational Collision Efficiencies of Small Drops with Application to Raindrop Growth JOHN STARK, MICHAEL ROTHER, University of Minnesota Duluth — Historically, much work has been done to improve our understanding of raindrop formation and growth in the atmosphere. Current work by the authors has focused on calculating gravitational collision efficiencies for the interactions of small, spherical drops, including hydrodynamic and buoyant forces, the lubrication force, retarded and unretarded van der Waals forces, internal drop circulation, and Maxwell slip. Raindrops having radii less than or equal to 30 μm are considered. For such, small drops, the surrounding fluid inertia, as measured by the Reynolds number, remains negligible. However, drop inertia, as measured by the Stokes number, can be significant, particularly for drops with radii between 10 and 30 μm. At finite Stokes numbers and low Reynolds numbers, the hydrodynamic forces remain linear in the drops translational velocities, but the hydrodynamic forces do not balance the applied forces. The objective of the work presented here is to analyze the relative importance of effects being considered and compare our collision efficiency results with those obtained previously by several different authors.

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