Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

An efficient representation of hydrodynamic interaction of cloud droplets and its application to collision efficiency[1] BOGDAN ROSA, LIAN-PING WANG, University of Delaware, WOJCIECH GRABOWSKI, National Center for Atmospheric Research (NCAR) — An efficient method for treating the hydrodynamic interaction of two spherical particles settling under gravity is developed in order to evaluate the collision efficiency. An effort is made to ensure accuracy of the method for any inter-particle separation by considering three separation ranges. The first is the long- range interaction where a second-order multipole method is applied. The second range concerns the short-range interaction where leading-order lubrication expansions are employed. Finally, for the intermediate range, a third-order polynomial fitting is proposed to bridge the long-range and short-range interactions. This integrated representation is found to be highly accurate when compared with the exact two-body solution of Stokes flows. Using this efficient method, accurate collision efficiencies for the case of gravitational interaction have been calculated. Extension of the method to many-body interactions and to a turbulent background flow will also be discussed.

[1]Work supported by NSF and NCAR.

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Date submitted: 07 Aug 2007 Electronic form version 1.4