

A 3-D Numerical Simulation of Dust Aggregate Collisions

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Coagulation and fragmentation processes of dust aggregates by their mutual collisions in a protoplanetary disk are important to understand planetesimal formation. Although previous numerical studies [1] on dust aggregate collisions reveal some useful aspects on the growth of dust aggregates, their simulations are insufficient to fully explore the dust aggregate structure because of, for example, two dimensional calculation and a small number of grains. In addition, recent experimental studies [2] show that grain interactions used in the numerical simulations are in question. We carry out numerical simulations of dust aggregate collisions by using a method similar to the previous studies [1, 3], but in three dimensions and with a larger number of grains than the previous ones, taking account of various kinds of grain interactions. From the numerical results, we discuss the dependence of the structure of dust aggregates on material parameters and collisional velocities. [1] Dominik, C. and Tielens, A. G. G. M.1997, *Astrophys. J.*480, 647[2] Blum, J. and Wurm, G.2000, *Icarus* 143, 138 [3] Johnson, K. L., Kendall, K., and Roberts, A. D.1971, *Proc. R. Soc. London* 324, 301