

Numerical Simulation of Collisions of Visco-Elastic Dust Aggregates

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It is believed that planetesimals are formed through the collisional growth of dust aggregates, but the sticking mechanism of dust aggregates are not well understood. It is revealed experimentally (Kouchi et al. 2002, Kudo et al. 2002) that organic materials, one of the main components of dust grains, are viscoelastic materials and can dissipate kinetic energy during collisions.

We have developed a numerical code simulating collisions of dust aggregates composed of viscoelastic grains. The code is based on the Distinct Element Method (DEM) of two dimensions, which solves numerically equations of motion of the constituent particles interacting with the adjacent particles. The Voigt model is used to characterize the visco-elastic interaction between the particles. We found that viscoelastic dust aggregates stick more easily than elastic grain aggregates. Discussion will be given on the implications of planetesimal formation.