

Formation of Planetesimals through Gravitational Fragmentation of a Dust Layer

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Gravitational fragmentation of a dust layer is considered to be a prevailing process of planetesimals formation. The mass of a planetesimal formed by gravitational fragmentation has been estimated only by linear perturbation theory for axisymmetric mode, and is not yet examined by numerical simulations. In this study, we reproduce the gravitational fragmentation by local N-body simulations, and compare the mass of a fragment with the analytic estimate. According to the results of numerical simulations obtained until now, when Hill radius r_H , i.e., the radius of the sphere of gravitational influence of a particle, is larger than the sum of two particles $r + r'$, ellipsoidal aggregates are formed and dissolved repeatedly.