

Parameter Study of Satellite Formation via Giant Impact by N-body Simulation

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In the late stage of planet formation, there would be collisions between protoplanets. For example, the Moon is considered to be accreted from a debris disk generated by the impact of Mars-sized protoplanet and the proto-Earth. While the moon formation process has been studied in detail, statistical study on satellite formation from impact-generated disks has not been done.

However, it is important to understand the general satellite formation process because satellites around exoplanets are expected to be a major observational targets. In this study, we modeled a variety of debris disk parametrized with initial disk mass and radius, and performed N-body simulations to investigate the position, number, and mass of formed satellites. We found that largest satellite formed just outside the Roche limit radius on almost all condition, and a few smaller satellites formed in outer regions.

Keywords: satellite formation, N-body simulation, giant impact