

N-body simulations of Moon formation with cooling evolution of the protolunar disk

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The previous studies about Moon formation focused on the first and last stages: the giant impact process (~1 day) has been investigated by SPH simulations, and the lunar accretion process (~1 month) from the circumterrestrial particulate disk has been investigated by N-body simulations. Although the Moon formation process should proceed on the cooling timescale of the protolunar disk (~100 years), there has been no study to simulate the long-term evolution of the disk. In this study, we developed an N-body code to simulate the cooling evolution of a protolunar disk in vapor/melt equilibrium, and executed long-term N-body simulations for the disk evolution and lunar accretion processes simultaneously with PEZY-SC processors. Our result showed that "mini-Moons" system would form instead of forming a single Moon.

Keywords: Moon, formation, N-body simulation, protolunar disk, PEZY-SC