Sedimentation of Dust Grains in Proto-lunar Disk

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According to the giant impact hypothesis, the Moon is formed outside the Roche radius of Earth by the accretion of the material transported from the inner part of the impact-generated proto-lunar disk through gravitational instability. There are two modes of gravitational instabilities; one is the instability of the dust-gas mixture caused by cooling of the disk, the other is the instability of the equatorial dust layer formed by the sedimentation of dust particles. The mode of instability affects the time scale of the Moon formation and the state of the Moon-forming materials. In this study, we compare the time scales of sedimentation of the dust and cooling of the proto-lunar disk. The result indicates rapid Moon formation following the gravitational instability of the dust layer.