# N-body simulation of Haumea ring formation

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A ring has been discovered around the dwarf planet Haumea. The ring is located in the 3:1 mean motion resonance with Haumea's spin period (Ortiz et al. 2017). The purpose of this study is to understand the formation process of the ring. Based on the theory that Haumea's two satellites were formed because of a rotational fission of Haumea (Ortiz et al. 2012), we examined the formation process of the ring. First, we calculated the gravity field of Haumea, which has a triaxial ellipsoidal shape, and estimated the stable orbit region by using N-body simulations with the time-dependent gravity field. We found the unstable region locates just inside the 3:1 resonant orbit. Then, we calculated the Roche limit around a triaxial ellipsoidal body and estimated analytically the region where the ring would be formed. We found the Roche limit locates around the 3:1 resonant orbit. Now, we are developing a rubble pile N-body simulation code that includes the material strength to investigate the formation of the ring from the fragments of Haumea.

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