

L13a トロヤ群天体と太陽系の起源と軌道進化

Patryk Sofia Lykawka、Jonathan Horner (University of New South Wales)、Barrie Jones (The Open University)、Tadashi Mukai (神戸大学)

Trojan asteroids can be used to constrain Trojan formation mechanisms, giant planet formation/migration and the orbital structure in the asteroid and Kuiper belts. We performed numerical simulations totaling a few million massless objects under the gravitational influence of the four giant planets. Overall, Neptunian Trojans were obtained at the end of planet migration, composed of remaining local (primordial) and captured Trojan asteroids. In addition to Neptune, the other three giant planets were also able to capture and retain a significant population of Trojan objects from the planetesimal disk after planet migration. In general, captured Trojans yielded a wide range of eccentricities and inclinations, while local Trojans survived with colder orbital conditions. However, the bulk of captured objects decay over Gyr, providing an important source of new objects on unstable orbits (the Centaurs). Our results suggest the bulk of observed Jovian and Neptunian Trojan populations were captured from the primordial planetesimal disk during planet migration, but their high- i component ($>20\text{-}25^\circ$) remain unexplained so far.