The self gravity effect on the orbital stability of Twotinos

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We investigate how the orbital stability of Twotinos is changed by its self gravity using full N-body simulations. We showthe timescale in which the half of Twotinos becomes unstable, t_{half}, obey the formula,

$$t_{half} = 4 \times 10^6 (\frac{M_{tot}}{0.1 M_\oplus})^{-1} (\frac{m_p}{7.6 \times 10^{23} g})^{-1} (\frac{\langle i^2 \rangle^{1/2}}{0.002})(years), \quad (1)$$

using N-body simulations. Where M_{tot}, m_p, $\langle i^2 \rangle^{1/2}$ are the total mass of Twotinos, the maximum mass of planetesimals and the inclination dispersion. With this formular, we estimate the total mass of the actual Twotinos is reduced to the order of 0.01 $M_\oplus$ by the self gravity and secure perturbation of Planets even if there was huge mass such as several order of the earth mass in 1:2 MMR at the early age of the solar system. These results will invoke reexamination to many previous works explaining the dynamical evolution of TNOs

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