

On probability of capture into 1:1 ground-track resonance while descending towards an asteroid

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A spacecraft may be captured into a ground-track resonance while descending towards an asteroid using low-thrust propulsion. The probability of capture is typically estimated using Monte Carlo simulations. We have developed semi-analytic and analytic methodologies to estimate the probability of capture into a 1:1 ground-track resonance. The dynamics of the captured spacecraft and an escape from the capture are also described. As an example, estimations of the Dawn spacecraft's capture probability into a 1:1 ground-track resonance around Vesta are provided. The results are validated against numerical estimations based on Monte Carlo simulations.

This is a joint work with Wail Boumchita and Jinglang Feng.