

Kinetic Impact Planetary Defense Demonstration Mission Concept via Resonant Orbit Transfers.

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A new kinetic impact planetary defense demonstration mission concept based on resonant orbit transfers is proposed. Triple resonant trajectory between the Earth, asteroid, and spacecrafts was designed for the observer spacecraft and impactor spacecraft. The spacecrafts can approach the asteroid resonantly with very little fuel, which is beneficial closely flyby the asteroid before impact to acquire the characteristic of the asteroid, and to impact the asteroid for the impactor and to monitor the impact process for the observer, and to re-flyby the asteroid after impact to evaluate the impact effect, and to make additional re-flybys with very little fuel. The resonant orbit motion between the Earth, asteroid, and spacecraft is also beneficial for ground based observations to track and control the spacecrafts, and to evaluate the impact effect. For the 1:1:1 resonant motion, the mission can be completed within about 3 years. An example mission scenario is designed with 2019 VL5 as the candidate impact target.