
Modelling the Earth protection systems for hazardous asteroids deflection

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This study examines the characteristics of near-Earth asteroids. We consider two methods of changing the trajectory of a potentially hazardous asteroid: the first is with the help of the gravity tractor, and the second is by means of the propulsion device which is placed directly on the asteroid and uses local material as the propellant. Mathematical models have been developed by taking into account the gravitational perturbation from all bodies as well as the real positions of celestial bodies in the system. In this research we have generated mathematical models, control programs and software for the modelling and visualization of the asteroid's and gravity tractor's motion trajectories. The modelling results obtained prove the feasibility of the asteroid's deflection from the hazardous trajectory using modern space vehicles. Such space vehicles are designed by PAO RSC Energia and intended for the Lunar Program transportation missions.

Keywords: hazardous asteroid, modelling, mathematical model, software package, methods of coping with asteroidal hazard, motion trajectory

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