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Study on the Dynamics and Stabilities of Motions of the Trojan Asteroids Using Astronomical Dynamics and Computer Analysis RICHARD KYUNG, JUWON MOON, Choice Research Group — The study of Trojan asteroids is one of the prominent fields of astronomical dynamics. Trojan asteroids are small celestial bodies that share the stable orbits of planets or large moons. They move ahead or behind the main body to near one of its Lagrangian points. In celestial mechanics, the Lagrangian points are located by the physical and geometrical properties of the two large orbiting bodies. In this research, asteroids trapped in L4 and L5 locations on the orbits of planets were observed and analyzed to determine whether the Trojan asteroids maintain or deviate their positions in relation to the two large rotating bodies. Lagrange points, stabilities, and the motions around such points were studied for the three-body problem in astronomical mechanics. Furthermore, based on the equations of motion, including the accelerations and velocities of the planets and asteroids around Lagrange points, simulations of the orbit of Trojan asteroids system were performed using computer analysis. The 2D and 3D displays were obtained in either inertial frame or rotating frame. Modifications of the parameters and initialization were altered to create comparisons between the outputs of trajectories for different cases.

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