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Variational method for the calculation of efficient paths with gravitational assist

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The Lagrangian formulation of classical mechanics provides a satisfactory description of many classical physical systems in particular the analysis of the movement of bodies gives the interacting forces and fields. In orbital mechanics and aerospace engineering, gravitational assist has been widely used in sending of probes through and outside the solar system, taking advantage of the impulse and / or gravitational braking caused by massive celestial bodies. In this work, using the Lagrangian formulation of classical mechanics, more specifically, the variational method involving the use of the Euler-Lagrange equations, we will explore analytically and through numerical simulation the optimal paths for the shipment of probes from the earth to different planets of the inner and outer solar system. Taking into account the orbital positions of the planets under consideration, several launch windows will be studied during the period 2018-2028, analytically optimizing them using the theoretical formulation previously indicated. As a result, simulations of the most energy and temporary efficiency paths will be shown.

Biography

Jorge Luis Nisperuza Toledo is a Physical Engineer and completed his Master's Degree in Physics and PhD in Physics from the Universidad Nacional de Colombia. He is currently a Research Professor at Fundación Universitaria Los Libertadores, Bogotá-Colombia, and is the Director of the research group in Physics, Statistics and Applied Mathematics- FEMA. He has published several scientific articles in the field of Theoretical Physics, in the areas of Elementary Particle Physics and Cosmology. He has extensive teaching experience in courses: classical mechanics, electricity and magnetism, and mechanics and waves.

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