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Author: Mr. Saroj Kumar
Propulsion Research Center, University of Alabama in Huntsville, United States, sk0072@uah.edu

Dr. Jason Cassibry
Propulsion Research Center, University of Alabama in Huntsville, United States, cassibj@uah.edu

CONCEPTUAL MISSION DESIGN FOR THE EUROPA JUPITER SYSTEM USING
THERMONUCLEAR FUSION PROPULSION SYSTEM

Abstract

Interplanetary science missions to study outer gas giant planets and its Moons using conventional chemical propulsion system requires years to complete due to very low specific impulse. The thermonuclear fusion propulsion system provides high specific impulse and reasonably high thrust enabling reduced trip times to about one third of mission in comparison to chemical propulsion system. This paper presents the study of direct rendezvous mission to outer gas giant planet Jupiter and its Moon Europa. The detailed mission design is presented including spacecraft design, launch schedule, delta-V requirement, trajectory analysis and rendezvous with Jupiter and Europa using fusion propulsion system. Trip times, payload mass fraction capability are compared between the proposed mission and with that of NASA's Jupiter Europa orbiter mission which uses chemical propulsion and various gravity assists between Earth and Venus.