SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Space Transportation Solutions for Deep Space Missions (8-A5.4)

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FLY ME TO THE MOON ON AN SLS BLOCK II

Abstract

We examine how a 140 t to low Earth orbit (LEO) Block II configuration of the Space Launch System (SLS) can be used to perform a crewed Lunar landing in a single launch. We show that existing RSRMV solid rocket motors can be used to achieve Block II performance by using a core with six RS-25E engines and a large upper stage (LUS) with two J-2X engines. A cryogenic propulsion stage (CPS) with four RL-10C-2 engines is used to perform trans Lunar injection (TLI), Lunar orbit insertion (LOI) and 75% of powered descent to the Lunar surface. A Lunar module (LM) initially carrying two crew and 535 kg of cargo is used to perform the remaining 25% of Lunar descent. The LM is in two parts consisting of a crew and propulsion module (CPM) and non-propulsive landing and cargo module (LCM). The CPM returns the crew and 100 kg of samples to the waiting Orion in Lunar orbit for return to Earth.