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ESCAPADE: A LOW-COST FORMATION AT MARS

Abstract

The Escape, Plasma and Acceleration Dynamics Explorers (ESCAPADE) mission is supported by NASA's Science Mission Directorate (SMD) within an opportunity under the Small Innovative Missions for Planetary Exploration (SIMPLEx) program. The ESCAPADE mission includes two identical 374-kg spacecraft that will enter the same elliptical orbit about Mars, collecting in situ atmospheric data in formation over six months. The spacecraft will then transition to different science orbits and collect spatially different, simultaneous observations of the atmosphere over the next five months, with opportunities for extensions. This paper describes the mission design that enables two spacecraft to launch via one or two low-cost rideshare launches, transfer to Mars, and establish the Martian formation.

The ESCAPADE mission is the first mission to place two spacecraft into the same elliptical orbit about another planet in a formation, through a very low budget opportunity. The mission design described here enables the mission to collect high value science with minimal risk within the constraints of this opportunity. This paper focuses on the GNC challenges and solutions developed to meet these objectives.