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## SYSTEM ENGINEERING STUDY OF A FLOATING PROBE FOR TITAN MARE EXPLORATION

**Abstract**

Cassini-Huygens mission was a huge success and proved that liquid worlds exist on the small rocky moons of the outer solar system. Since then, new missions to explore Titan have been considered, for some of them, very seriously. Titan-Saturn System Mission was a joint project from NASA and ESA to continue what Cassini-Huygens began. Among the numerous objectives of the mission, one stands out for its originality: Titan Mare Explorer (TiME). This paper aims to study the TiME mission and to propose a revised mission concept of TiME. The proposed probe is a floating spacecraft that would land on the surface of Kraken mare at Titan north pole powered by the European Nuclear Power System (ENPS). The paper assesses the up-to-datedness of the TiME probe's technology, and introduces alternative technical solutions to the mission and new initiatives—such as wind sailing by drag modulation. The produced results are a functional analysis of the mission and a component map (Physical Architecture Breakdown) of the probe systems, an emphasis is put on the utilization of COTS and Model Based System Engineering (MBSE) tools. Keywords: Titan, floating probe, sailing, TiME, MBSE.