

Abstract Submitted
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Hydrodynamic Study of an Extraterrestrial Ship Design with SPH ANGELANTONIO TAFUNI¹, New Jersey Institute of Technology, JASON W. HARTWIG, STEVEN R. OLESON, NASA Glenn Research Center, RALPH D. LORENZ, Johns Hopkins University — NASA is considering an ad-hoc ship design to send to Titan’s seas as an alternative to the model submarine proposed in recent studies. The purpose of the mission would be to carry out scientific investigations autonomously above and under the surface of Titan’s seas, the latter to be conducted via deployable dropsondes stored within the ship’s interior. In this talk, results from a thoroughly conducted computational analysis will be presented, with a cost-effective and efficient approach to calculate the ship’s resistance based on its design and surroundings, and to determine power requirements. Smoothed particle hydrodynamics (SPH) is employed via the state-of-the-art code DualSPHyiscs. Recently developed open boundary conditions are implemented to limit the size of the computational domain, allowing the use of finer levels of resolution to resolve the physics accurately. The main objectives of the present work are 1) to analyze and understand the effect of non-Earth-like navigation conditions, such as lower gravity environment and sea composition; 2) to investigate the effect of flow parameters such as ship’s speed and sinkage on the total hydrodynamic resistance, and 3) to estimate the Effective Horsepower (EHP) and total propulsion power required.

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