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## **C3Or2A-03: A liquefaction model for a cryogenically refrigerated ellipsoidal tank**

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Over the past decades NASA has been focusing to develop technology that would allow for production of cryogenic propellants on the surfaces of the Moon or Mars. The in-situ propellant production reduces the amount of propellants needed to be taken to Moon/Mars and ultimately reduces mission cost. Utilizing Lunar/Martian resources, the produced gases are liquefied and stored prior to use on the ascent vehicle. In this paper, a model for the liquefaction process of gaseous propellants in a cryogenically refrigerated tank is presented. The tank is considered to be cylindrical with elliptical top and bottom domes. A multi-node transient model is developed based on the mass and energy conservation principles and wall-gas and liquid-gas interfacial mass and heat transfer correlations. The model is incorporated into the Generalized Fluid System Simulation Program (GFSSP), an MSFC in-house general-purpose computer program for flow network analysis. Description of the model and comparison of predicted results with available test data will be presented and discussed.

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