MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Poster Session (P)

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DESIGN AND OPTIMIZATION OF VARIABLE DENSITY MULTILAYER INSULATION FOR CRYOGENIC TANK

Abstract

A theoretical model is developed to numerically calculate heat transfer of vacuum multilayer insulation. Multilayer insulation structure has been divided into several domains of different layer density according to the distribution of heat transfer, which includes radiation heat transfer, solid and gas heat conduction. The effects of variable layer density on insulation performance are analyzed to get an optimal layer density which minimized the heat flux. The heat transfer distribution and the effect of hot boundary temperature with the optimal layer density are also analyzed.