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C2Or2C-03: Validation of Universal Cryogenic Flow Boiling Correlations in Thermal Desktop for Liquid Helium

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Understanding two-phase cryogenic propellant behavior is key to enabling technologies for future spaceflight missions to the Moon and Mars. Developing accurate models of two-phase flow phenomena, particularly flow boiling in the heating case is relevant to the propellant transfer process both in microgravity and on other planetary surfaces. Currently there are no model-verified universal correlations for the heat transfer coefficient across the boiling curve for cryogens. Previous work has focused on developing these universal correlations for cryogens in a heated tube for various regimes across the boiling curve. This work demonstrates how these correlations have been ported into Thermal Desktop. This Thermal Desktop model has then been used to model a historical dataset of flow boiling experiments in the heating configuration for Helium. The new correlations show an improvement over the original built-in flow boiling correlations in Thermal Desktop in predicting the experimental results when compared to the original dataset.

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