Contribution ID: **444** Type: **Poster**

C1Po3D-07: Design considerations for valve dynamics of a positive displacement cryogenic pump

Monday 19 May 2025 14:00 (2 hours)

Operation of a cryogenic pump near saturated conditions proves challenging to maintain fluid quality throughout the intake process of the pump. Design considerations for minimizing the phase change of fluid across the pump are explored, highlighting the goal of maximizing mass flow throughput of the positive displacement pump. CFD studies were conducted to predict state change performance across the inlet valve of the pump in saturated liquid nitrogen conditions. High-speed video of the designed valve operating in liquid nitrogen on an optically accessible cryogenic setup were captured to validate the CFD predictions. Experimental results indicate good agreement with qualitative CFD analysis regarding state change performance, and demonstrate the underlying dynamics of designing dynamic cryogenic valves.

Author: DEMSKI, Brandon

Co-author: HUMPHREYS, Luke

Presenter: DEMSKI, Brandon

Session Classification: C1Po3D - Thermophysical Properties and Transport Processes I