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Validity of Molecular Tagging Velocimetry in a Cavitating Flow for Turbopump Analysis KAYLA KUZMICH, DOUG BOHL, Clarkson University — This research establishes multi-phase molecular tagging velocimetry (MTV) use and explores its limitations. The flow conditions and geometry in the inducer of an upper stage liquid Oxygen (LOX)/LH2 engine frequently cause cavitation which decreases turbopump performance. Complications arise in performing experiments in liquid hydrogen and oxygen due to high costs, high pressures, extremely low fluid temperatures, the presence of cavitation, and associated safety risks. Due to the complex geometry and hazardous nature of the fluids, a simplified throat geometry with water as a simulant fluid is used. Flow characteristics are measured using MTV, a noninvasive flow diagnostic technique. MTV is found to be an applicable tool in cases of low cavitation. Highly cavitating flows reflect and scatter most of the laser beam disallowing penetration into the cavitation cloud. However, data can be obtained in high cavitation cases near the cloud boundary layer. Distribution A: Public Release, Public Affairs Clearance Number: 12654

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