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**A Dynamic Testbed for Supercavitating Vehicles**[1] DAVID SANABRIA, GARY BALAS, ROGER ARNDT, University of Minnesota — Underwater vehicles that travel inside a gas cavity offer possibilities for high-speed transportation as a result of reduced contact area with the fluid and drag reduction. Validation and testing of mathematical models and control systems for these vehicles is a challenge due to the cost and complexity of experimental facilities and procedures. In particular, planing forces generated when the vehicle back end pierces the supercavity, can lead to instability and are challenging for validation and testing. A cost efficient approach to the experimental validation of control systems for a supercavitating vehicle is presented in this talk. The test method uses a small scale supercavitating vehicle, free to rotate in a high-speed water tunnel, to evaluate control systems designed for stabilization and tracking of attack angle commands. The vehicle is equipped with a disk cavitator and two lateral fins used for control. The key feature of the validation approach is that planing forces and their effects are captured in the high-speed water tunnel. The proposed validation method is uniquely suitable to validate the robustness of control strategies in the presence of realistic flow conditions and planing.

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