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Investigation of a Cavitating Jet Emanating From a Crown-Shaped Nozzle STEPHANE POUSSOU, RAUL SANCHEZ, MICHAEL PLESNIAK, Purdue University — Cavitation in submerged jets is used in applications such as material cutting or underwater surface cleaning. Incipient conditions have been found to depend on the flow structure in the near-jet region. The developing shear layer can be passively controlled at the nozzle exit by modifying the geometry of the edge, which affects the three-dimensionality of the vortical structures. Recent investigation using PIV and high-speed shadowgraphs showed that a crown-shaped geometry alters significantly the near-jet flow field by introducing streamwise vorticity. Substantial deviations from axisymmetry were observed in the magnitudes of the normal Reynolds stresses and spanwise vorticity at particular azimuthal locations. In the present study, a 3D Large Eddy Simulation (LES) is carried out to investigate the turbulent jet emanating from a crown-shaped nozzle at typical Reynolds number (based on diameter) of the order of 300,000. Numerical and experimental data are compared. The effects of the nozzle on the Reynolds stresses and cavitation inception are investigated at different flow conditions.

Michael Plesniak
Purdue University

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