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An experimental investigation of cavitation in JP8 jet fuel.¹

MUHAMMAD IQBAL, FLINT THOMAS, PATRICK DUNN, MICHAEL DAVIS,
Center for Flow Physics and Control, University of Notre Dame — In this experimental study flow induced cavitation in JP8 jet fuel is investigated for the first time. In internal fuel handling machinery cavitation is associated with sharp turns in the flow path. It is well known that cavitation bubble collapse leads to damage and eventual failure of pumps and valves. In this study we consider a generic flow problem that is relevant to a wide number of fuel handling applications. This consists of an axisymmetric jet of JP8 fuel that emerges from the center of a disk. The jet impinges on a second disk suspended just above the first and consequently forces the flow to turn suddenly and flow radially into a thin gap between the disks. In this manner, the initially axial flow must turn rapidly into the radial direction. The large radial dilatation acts on nuclei present to give rise to cavitation bubble formation. Detailed experiments are performed in a closed loop facility that allows the dissolved gas and contaminant particle concentration in the fuel to be controlled. The cavitation inception process is studied through high resolution imaging, pressure measurement and with a phase Doppler particle analyzer.

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Flint Thomas
Center for Flow Physics and Control, University of Notre Dame

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