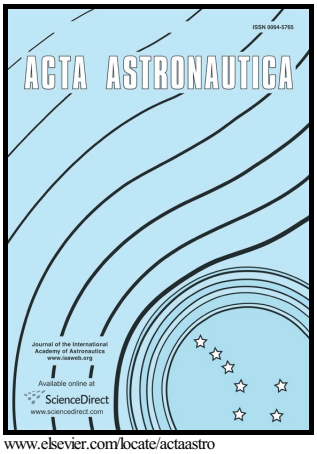

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Cavitation Instabilities of an Inducer in a Cryogenic Pump

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Abstract

Inducers assist cryogenic pumps to operate safely under cavitation conditions by increasing the pressure of the impeller inlet, but create cavitation instabilities. The use of cryogenic fluids requires special attention because of safety and handling concerns. To examine the cavitation instabilities of a cryogenic pump, two kinds of working fluids, water and liquid oxygen, were employed. The cavitation instabilities were measured with an accelerometer installed on the pump casing. The flow coefficient and the head slightly decrease with decreases in the cavitation number before the cavitation breakdown. These trends are true of both fluids. Several cavitation instabilities were identified with the accelerometer. At lower flow coefficients, super-synchronous rotating cavitation was found in a similar cavitation number range for both fluids. At higher flow coefficients, the cavitation numbers of the cavitation instabilities in the liquid oxygen test are smaller than those of the water test.

Keywords: Turbopump, Inducer, Cavitation instability, Rotating cavitation, Thermodynamic effect