Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

**The Other Source of Inducer Backflow** TATE FANNING, RYAN LUNDGREEN, DANIEL MAYNES, STEPHEN GORRELL, Brigham Young Univ - Provo, KERRY OLIPHANT, Concepts NREC — High suction performance inducers are used as a first stage in turbopumps to hinder cavitation and promote stable flow. Despite the distinct advantages of inducer use, an undesirable region of backflow and resulting cavitation can form near the tips of the inducer blades. This flow phenomenon has long been attributed to tip leakage flow, or the flow induced by the pressure differential between pressure and suction sides of an inducer blade at the tip. We examine backflow of a single inducer geometry at varying flow coefficients with a tip clearance of 0.4 mm and a tip clearance of 0 mm. Removing the tip clearance removes any potential tip leakage flow. Despite the removal of the tip leakage flow, backflow persists, and is essentially unaffected. We have observed backflow penetrating 1.1 tip diameters upstream of the leading edge in the inducer with tip clearance, and 0.95 tip diameters in the inducer without tip clearance under the same flow coefficient. A comprehensive analysis of these simulations suggests that blade inlet diffusion, not tip leakage flow, is the driving force for the formation of tip backflow.

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Date submitted: 30 Jul 2015 Electronic form version 1.4