Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Inducer Performance with Varying Inlet Blade Angles with a Stability Control Device RYAN LUNDGREEN, DANIEL MAYNES, Brigham Young University, KERRY OLIPHANT, Concepts NREC, STEVE GORRELL, Brigham Young University — High suction performance pumps use an inducer as the first stage of the pump to limit the amount of cavitation within the rest of the machine. Suction performance improves significantly when inducers are operated at low flow coefficients. Small blade angles are required at low flow coefficients to maintain a stable operation, however, they are more prone to cavitation blockage and are less robust structurally. It has been shown that a stability control device has a significant stabilizing effect on the flow through an inducer, particularly at low flow coefficients. A local increase in the mass flow rate at the leading edge of the inducer allows the blade to operate at the design flow coefficient regardless of the mass flow rate through the machine. This allows inducers with a greater inlet blade angle, which are less prone to cavitation blockage and can be more structurally robust, to maintain stable operation at low flow coefficients. Numerical simulations were conducted on four different inducers that implemented the stability control device, with inlet blade angles ranging from 7 to 14 degrees. Analysis from the results has led to significant insights into how changes in the inlet blade angle affect the physics and performance of the stability control device.

Ryan Lundgreen
Brigham Young University

Date submitted: 31 Jul 2014 Electronic form version 1.4