

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Hot-wire based phase resolved measurement techniques for turbomachinery flows NICHOLAS JAFFA, SCOTT MORRIS, JOSHUA CAMERON, University of Notre Dame — Resolving the details of turbomachinery rotor flows from the stationary reference frame is difficult due to the high sensor frequency response required. Hot-wires have the necessary frequency response but are sensitive to both total temperature and velocity. In high-speed turbomachinery flows, the large blade-to-blade total temperature gradients prevent traditional hot-wire methods from being used to measure velocity directly. In order to decouple the effects from the temperature variation, a single constant temperature hot-wire was operated at different overheats at the exit of a high-speed transonic axial compressor rotor. The multiple overheat method was used to decouple the phase locked averages of total temperature and velocity magnitude from the phase locked average hot-wire voltages for different overheats. The phase locked average total temperature and velocity magnitude fields show flow features relative to the rotor including blade wakes, boundary layers, and tip clearance flows.

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Date submitted: 02 Aug 2013

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