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Experimental Investigation of Effect of Wall Suction on Cross-Flow Absolute Instability in a Rotating Disk Boundary Layer JOANNA HO, THOMAS CORKE, ERIC MATLIS, University of Notre Dame — The research is intended to investigate the effect of uniform suction on the absolute instability of Type I cross-flow modes on a rotating disk. Specifically it is designed to investigate if wall suction will transform the absolute instability into a global mode as postulated in the numerical simulations of Davies and Carpenter (2003). The disk is designed so that with a suction parameter of $a = w/(\nu\omega)^{1/2} = 0.4$, the radial location of the absolute instability critical Reynolds number, $R_{C_a} = 803$, occurs on the disk. Uniform wall suction is applied from $R = 449$ to 919. The design for wall suction follows that of Gregory and Walker (1950), where an array of holes through the disk communicate between the measurement side of the disk and the underside of the disk in an enclosure that is maintained at a slight vacuum. The holes in the measurement surface are covered by a stretched silk cloth that provides a smooth, finely porous surface. A companion numerical simulation was performed to investigate the effect of the size and vacuum pressure of the underside enclosure on the uniformity of the measurement surface suction. Temporal disturbances are introduced using the method of Othman and Corke (2006), and the evolution of the resulting wave packets is documented.

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