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Partial Cavity Flows at High Reynolds Numbers SIMO MAKIHARJU, BRIAN ELBING, University of Michigan, ANDREW WIGGINS, DAVID DOWLING, MARC PERLIN, STEVEN CECCIO, University of Michigan — Partial cavity flows created for friction drag reduction were examined on a large-scale. Partial cavities were investigated at Reynolds numbers up to 120 million, and stable cavities with frictional drag reduction of more than 95% were attained at optimal conditions. The model used was a 3 m wide and 12 m long flat plate with a plenum on the bottom. To create the partial cavity, air was injected at the base of an 18 cm backwards-facing step 2.1 m from the leading edge. The geometry at the cavity closure was varied for different flow speeds to optimize the closure of the cavity. Cavity gas flux, thickness, frictional loads, and cavity pressures were measured over a range of flow speeds and air injection fluxes. High-speed video was used extensively to investigate the unsteady three dimensional cavity closure, the overall cavity shape and oscillations.

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