

Abstract Submitted
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Validated model of arc-filament plasma actuators for control of wall-bounded flows¹ DANIEL BODONY, MAHESH NATARAJAN, University of Illinois at Urbana-Champaign — Plasma actuators based on the electrical arcs between two electrodes have shown promise in controlling high-subsonic and low-supersonic flows. Simulation-based predictions of these flows have often used heuristic models for the effect the plasma has on the flow to be controlled. In this talk we present a two-parameter model of the actuator which combines the unsteady Joule heating induced by the plasma with a thermally perfect model of air. PIV and spectroscopy data are used, in conjunction with simulations, to understand the two parameters and demonstrate how their values are to be determined. The importance of the cavity in which the electrodes are mounted is discussed, as is the role of diffusion. We demonstrate the use of the actuator model by controlling a high-subsonic, separating boundary layer in an S-duct geometry.

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