

Abstract Submitted  
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**Modeling of the Flow Field from Turbofan Nozzles with Porous Fan Flow Deflectors**<sup>1</sup> ANDREW JOHNSON, JUNTAO XIONG, FENG LIU, DIMITRI PAPAMOSCHOU, U.C. Irvine — Wedge-shaped fan flow deflectors have shown promise in reducing noise from turbofan-type nozzles. Porous deflectors have a particular advantage as they allow some flow through the wedge, thus preventing strong velocity gradients that can cause excess noise near the wedge base. Computational modeling of the resulting flow field is challenging because it is not feasible to grid the perforations of the deflector. Instead, we use a body-force term in the momentum equation that is applied locally in the vicinity of the deflector porous surface. The body-force term is calibrated based on experimental velocity measurements inside and outside the flaps forming the wedge, as well as computations on simplified two-dimensional models of the wedge. For a given wedge angle, the flow field is governed by the porosity of the wedge surface as well as the “illumination angle” of the perforation holes. The latter parameter is crucial for obtaining a uniform velocity distribution at the wedge base, and can be adjusted by varying the surface thickness or the aspect ratio of the perforation holes.

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