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Vortex Noise Reductions from a Flexible Fiber Model of Owl Down JUSTIN JAWORSKI, Lehigh University, NIGEL PEAKE, University of Cambridge — Many species of owl rely on specialized plumage to reduce their self-noise levels and enable hunting in acoustic stealth. In contrast to the leading-edge comb and compliant trailing-edge fringe attributes of owls, the aeroacoustic impact of the fluffy down material on the upper wing surface remains largely speculative as a means to eliminate aerodynamic noise across a broad range of frequencies. The down is presently idealized as a collection of independent and rigid fibers, which emerge perpendicularly from a rigid plane and are allowed to rotate under elastic restraint. Noise generation from an isolated fiber is effected by its interaction with a point vortex, whose motion is induced by the presence of the rigid half-plane and the elastically-restrained fiber. Numerical evaluations of the vortex path and acoustic signature furnish a comparison with known analytical results for stationary fibers, and results from this primitive model seek to address how aerodynamic noise could be mitigated by flexible fibers.

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