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Aerodynamic damping of oscillating cantilevers from side walls in close proximity ANDREW EASTMAN, MARK KIMBER, University of Pittsburgh — As a result of their simplicity, low power consumption, and relative ease of implementation, oscillating cantilevers have been investigated for use in many applications. However, use in many circumstances requires a close proximity to one or multiple boundaries. This can cause added damping to the flow that inhibits the operational effectiveness. This paper investigates the fluidic damping effect of two boundaries parallel to the oscillating motion of the fan at multiple voltage and frequency inputs. Experiments performed across a range of operating conditions showed that decreasing the distance between the boundaries and the oscillating cantilever increases the aerodynamic damping, which can be as high as 5X compared to normal (i.e., without sidewalls) operation. However this also decreases the power consumption which can be beneficial under certain circumstances. The power consumption also peaks when operating at resonance. The findings in the paper are significant to creating a basis to judge how to best operate an oscillating cantilever to achieve the maximum operational effectiveness.

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