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Aeroelastic Flutter Behavior of Cantilever within a Nozzle-Diffuser Geometry LUIS PHILLIPE TOSI, TIM COLONIUS, Caltech, STEWART SHERRIT, HYEONG JAE LEE, Jet Propulsion Laboratory — Aeroelastic flutter arises when the motion of a structure and its surrounding flowing fluid are coupled in a constructive manner, causing large amplitudes of vibration in the immersed solid. A cantilevered beam in axial flow within a nozzle-diffuser geometry exhibits interesting resonance behavior that presents good prospects for internal flow energy harvesting. Different modes can be excited as a function of throat velocity, nozzle geometry, fluid and cantilever material parameters. This work explores the relationship between the aeroelastic flutter instability boundaries and relevant non-dimensional parameters via experiments. Results suggest that for a linear expansion diffuser geometry, a non-dimensional stiffness, non-dimensional mass, and non-dimensional throat size are the critical parameters in mapping the instability. This map can serve as a guide to future work concerning possible electrical output and failure prediction in energy harvesters.

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