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Characterizing self-excited fluidic energy harvesters subjected to Vortex Induced Vibration by utilizing Griffin scaling[1] NIELL ELVIN, VAHID AZADEH RANJBAR, YIANNIS ANDREOPOULOS, CUNY-CCNY — The present work has experimentally characterized energy harvesters consisting of a circular cylinder mounted at the tip of a flexible cantilever beam. VIV phenomena such as lock-in range, maximum amplitude of transverse oscillation and hysteresis effects have been studied by testing different physical parameters such as structural damping, mass ratio, and aspect ratio. Griffin plot generated by the experimental data of SDOF high aspect ratio circular cylinders have been used to validate VIV. As the harvester is a continuous system of low aspect ratio circular cylinders, three cases have been investigated: low aspect ratio effect of cylinders, effect of multiple modes or coupled transverse-torsional oscillation and non-linear effect due to large deformation of flexible cantilever beams. Griffin plot shows large variance in the case of aspect ratios less than 3. Coupled transverse-torsional oscillation affects VIV negatively. Results show that added structural damping due to piezoelectric patches attached to the cantilever beam decreases electrical power output as a non-linear function of mass ratio.

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