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Energy-harvesting potential of multiple elastic structures in tandem arrangement BO YIN, HAOXIANG LUO, Vanderbilt University — Vortex-induced flapping vibrations of elastic structures attached with piezoelectric materials, i.e., “piezo-leaves”, have recently been explored for its potential application in wind energy harvesting (e.g., Li, Yuan, and Lipson, *J. Appl. Phys.*, 2011). In this work, we explore the possibility of enhancing the structural vibration and energy harvesting performance of the generator by putting the leaves in tandem arrangement and within close range of hydrodynamic interaction. A two-dimensional model is developed, where two or more elastic plates are mounted in a cross flow. In the case of two plates, the numerical simulation shows that at a particular distance, the vibration of the downstream plate is greatly increased, and so is the energy level of the entire system. For multiple plates, we observed both synchronized and apparently chaotic vibration modes. The characteristics of the vortex interaction, plate deformation, and energetics will be presented for those coupling modes.

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