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**A two-dimensional potential flow model of the interaction of a vortex ring passing over a flexible plate for energy harvesting applications**
JIACHENG HU, SEAN PETERSON, Department of Mechanical and Mechatronics Engineering, University of Waterloo — Recent advancements in highly deformable smart materials have lead to increasing interest in small-scale energy harvesting research for powering low consumption electronic devices. One such recent experimental study by Goushcha et al. (APL, 2014) explored energy harvesting from a passing vortex ring by a cantilevered smart material plate oriented parallel to, and offset from, the path of the ring in an otherwise quiescent fluid. The present study focuses on modeling this experimental study using potential flow. The problem is modeled in two dimensions with the vortex ring represented as a pair of counter-rotating free vortices. Vortex parameters are determined to match convection speed of the ring and its pressure loading on the beam. The plateis approximated as a Kirchhoff-Love plate, and represented as a finite length vortex sheet in the fluid domain. The analytical model matches the experimentally measured strain at the clamped end of the beam well, suggesting that the model can be used as a tool to optimize this energy harvesting configuration. Results of a parametric study will be presented, as well as a discussion of the range of parameters for which the model is a good representation of the physical system.

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