

Abstract Submitted  
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**Flow-Induced Stiffness Enables Torsional Oscillations in a Two-Degree-of-Freedom, Flexibly-Mounted and Free-to-Rotate Rigid Plate<sup>1</sup>**

PARIYA POURAZARM, YAHYA MODARRES-SADEGHI, University of Massachusetts Amherst — We study flow-induced oscillations of a flexibly-mounted rigid flat plate placed in water, for a plate with two degrees of freedom in the torsional and transverse directions, with no torsional spring, i.e., no structural stiffness in the torsional direction. At low flow velocities, the plate rotates in the clockwise or counterclockwise direction several times while oscillating in the transverse direction. The frequency of these full rotations converges to a constant number for the majority of flow velocities. At higher flow velocities, the full rotations stop and the plate starts to oscillate in the torsional direction as well, as if there existed a torsional spring. It is concluded that these oscillations in the torsional direction are made possible due to the flow-induced stiffness, since there is no structural stiffness in that direction.

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Pariya Pourazarm  
University of Massachusetts Amherst

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