

Abstract Submitted  
for the DFD14 Meeting of  
The American Physical Society

**Flow-induced instabilities of a flexibly-mounted rigid plate placed in water**<sup>1</sup> PARIYA POURAZARM, YAHYA MODARRES-SADEGHI, MATTHEW LACKNER, University of Massachusetts Amherst — Flow-induced instabilities of a flat rigid plate placed in water with either one degree of freedom (torsional) or two degrees of freedom (transverse and torsional) are studied. The onset of dynamic instability for each configuration was pinpointed and the post-critical behavior of the system in both 1 DoF and 2 DoF cases was investigated. For the 1DoF case, for all flow velocities higher than the critical, a periodic motion was observed. The amplitude of oscillations increased with increasing flow. For the 2DoF system, a period-doubling route to chaos was observed. The post-critical periodic oscillations were followed by period-2 and later on period-4 oscillations, which led to chaotic oscillations at higher flow velocities. Flow visualizations showed that for periodic oscillations, one vortex was shed in each cycle, and for period-2 oscillations, two vortices were shed in each cycle.

<sup>1</sup>The support provided by the Wind Technology Testing Center, a part of the Massachusetts Clean Energy Center is acknowledged.

Pariya Pourazarm  
University of Massachusetts Amherst

Date submitted: 31 Jul 2014

Electronic form version 1.4