

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Stability and scalability of piezoelectric flag XIAOLIN WANG, SILAS ALBEN, CHENYANG LI, YIN LU YOUNG, Univ of Michigan - Ann Arbor — Piezoelectric material (PZT) has drawn enormous attention in the past decades due to its ability to convert mechanical deformation energy into electrical potential energy, and vice versa, and has been applied to energy harvesting and vibration control. In this work, we consider the effect of PZT on the stability of a flexible flag using the inviscid vortex-sheet model. We find that the critical flutter speed is increased due to the extra damping effect of the PZT, and can also be altered by tuning the output inductance-resistance circuit. Optimal resistance and inductance are found to either maximize or minimize the flutter speed. The former application is useful for the vibration control while the latter is important for energy harvesting. We also discuss the scalability of above system to the actual application in air and water.

Xiaolin Wang
Univ of Michigan - Ann Arbor

Date submitted: 23 Jul 2015

Electronic form version 1.4