Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Flapping dynamics of an inverted flag in a uniform flow JAEHA RYU, SUNG GOON PARK, BOYOUNG KIM, HYUNG JIN SUNG, KAIST — Much research in recent years has focused on the flow dynamics of flexible structures in a uniform flow and particularly on the flow dynamics related to energy harvesting systems. An energy harvesting system comprising piezoelectric patches attached to the surface of a flexible structure can convert the energy stored in solid deformations into an electric current that powers a purely resistive output circuit. Recently, an inverted flag which has the freely moving leading edge and the clamped trailing edge was suggested. The inverted flag improved the amount of strain energy that was converted into the flag deformations from the surrounding fluid. In this study, the flapping dynamics of an inverted flag in a uniform flow were simulated using the immersed boundary method. The flapping dynamics of and vortical structures around the inverted flag were examined in terms of the bending rigidity and the Reynolds number. The strain energy of the inverted flag and the proportion of the strain energy of the inverted flag to the kinetic energy of the flow were considered as an indicator of the energy harvesting system efficiency.

Jaeha Ryu
KAIST

Date submitted: 03 Aug 2015 Electronic form version 1.4