Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Numerical investigations on the vortex-induced vibration of moving rigid body by using the Lattice Boltzmann Method[1] XIAOHAI JIANG[2], TAEHUN LEE, YIANNIS ANDREOPOULOS, ZHEXUAN WANG, Department of Mechanical Engineering, City College of City University of New York, New York, 10031, USA — Vortex-induced vibrations (VIV) phenomena related to self-excited energy harvesters consisting of circular or square cylinders have been investigated numerically by using the BGK or MRT Lattice Boltzmann Method. In the present work such a harvester is placed inside a channel flow and is allowed to oscillate without a structural restoring force in a direction normal to the flow. Currently the half-way bounce-back boundary scheme and interpolations are being used to model the moving boundary. The numerical results were compared to the ones by classical CFD methods and experiments. A good agreement was obtained. The vortex dynamics and the development of the flow patterns for different flow parameters such as Reynolds number, blockage and aspect ratios will be presented. Particular emphasis is given to the dynamics of vortex pairing observed in several of the simulations. The present approach will be extended to simulate the flexible beam with the Immersed Boundary Method.

[1]Sponsored by the National Science Foundation (CBET #1033117) and a fellowship support from China Scholarship Council.
[2]Key Laboratory of Transient Physics, Nanjing University of Science and Technology, Nanjing, 210094, China

Xiaohai Jiang
Department of Mechanical Engineering,
City College of City University of New York, New York, 10031, USA

Date submitted: 01 Aug 2013 Electronic form version 1.4