

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Interaction of pitching and heaving flexible flags in a viscous flow¹

SOHAE KIM, WEI-XI HUANG, HYUNG JIN SUNG, KAIST — In a group of swimming and flying animals, an individual interacts with one another via surrounding flow. Vortices shed by a body are found to strongly influence the downstream body using vortex-vortex and vortex-body interactions. In order to investigate the interactions between flexible bodies and vortices, the present study models two tandem flexible flags in viscous flow by numerical simulation using an improved version of the immersed boundary method. When the downstream flag has pitching and heaving motions, drag on the downstream flag gradually increases and decreases as the pitching and heaving phases vary from 0 to 2π ; and the drag coefficient of the downstream flag drops even below the value of a single flag. Such drag variations are influenced by the interactions between vortices shed by the upstream flexible body and vortices surrounding the downstream one. Interaction of tandem flexible flags is investigated as a function of the gap distance between flags, and pitching and heaving phases at intermediate Reynolds numbers.

¹This work was supported by the Creative Research Initiatives (Center for Opto-Fluid-Flexible Body Interaction) and World Class University programs of MEST/NRF.

Sohae Kim
KAIST

Date submitted: 10 Aug 2010

Electronic form version 1.4