Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Interaction of in-phase and out-of-phase flexible filament in fish schooling[1] EMAD UD DIN, HYUNG JIN SUNG, KAIST — Fish schooling is not merely a social behavior; schooling improves the efficiency of movement within the fluid environment. Inspired by the schooling from a hydrodynamic perspective, a group of aquatic animals is modeled as a collection of individuals arranged in a combination of tandem and side-by-side (diamond) formation. The downstream bodies are strongly influenced by the vortices shed by the upstream body shown by vortex-vortex and vortex-body interactions. Trailing fish takes advantage of this flow pattern for energy economy. To investigate the interactions between flexible bodies and vortices, in the present study three flexible flags in viscous flow are solved by numerical simulation using an improved version of the immersed boundary method for in-phase and out-of-phase filaments. The drag coefficient of the downstream filaments 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 filaments. Interaction of the flexible flags is investigated as a function of the gap distance between flags and different bending coefficients, for in-phase and out-of-phase cases at intermediate Reynolds numbers.

[1]This study was supported by the Creative Research Initiatives of NRF/MEST (No. 2011-0000423) of Korea

Emad Ud din
KAIST

Date submitted: 05 Aug 2011 Electronic form version 1.4