Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Schooling behavior of heaving flexible airfoils[1] SUNGHYUK IM, HYUNG JIN SUNG, KAIST — The schooling behavior of rigid and flexible NACA0017 airfoils in the heaving motion is experimentally explored in a merry-go-round equipment. The airfoil was attached to the end of a horizontal support bar whose other end was connected to the freely rotating vertical axis. The axis was forced to undergo a sinusoidal motion in the vertical direction to make a pure heaving motion of the airfoils in the frequency range of 0.5 to 5 Hz. The propulsion due to the heaving airfoils is expressed by a horizontally rotating speed of the support bar. This experimental setup is simulating infinite schooling situations of airfoils in an in-phase heaving motion with the streamwise distance d. The ratio of the distance to the chord length d/c was determined by the number of airfoils ($1 \leq n \leq 8$). The rotational frequency F according to the heaving frequency f was measured with different experimental parameters. The schooling number $S = f/(nF)$, representing the number of heaving oscillations between each airfoil, was introduced to explain the schooling behavior of the airfoils. The effects of the flexibility, d/c and f on the propulsive performance were examined with the schooling behavior of the airfoils.

[1]This work was supported by the Creative Research Initiatives (No. 2016-004749) program of the National Research Foundation of Korea (MSIP).

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Date submitted: 31 Jul 2016 Electronic form version 1.4