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Flow-induced vibration of an array of cylindrical pendulums JUNYOUNG KIM, HYEONSEONG KIM, DAEGYOUM KIM, KAIST — We investigated experimentally self-excited vibration of an array of cylindrical pendulums in a uniform flow in order to find its potential application to energy harvesting. A cylindrical pendulum is fixed to a rigid upper plate via a thin elastic sheet so that it can swing perpendicularly to the free stream. Although this type of model has been studied for electrical energy generation, few studies have been conducted in order to understand the detailed physics of fluid-structure interaction. In this study, the flow pattern and dynamics of pendulums were examined by varying distance among the pendulums, free-stream fluid velocity, density ratio of the fluid and the pendulums. The interaction of an upstream bluff body and pendulums was also considered to investigate how the wake of the bluff body affects the oscillations of cylinders. With this experimental setup, the pendulums show various patterns such as stationary mode and out-of-phase oscillation mode.

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