

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Fluid-structure-interaction of a flag in a channel flow.¹

YINGZHENG LIU, YUELONG YU, WENWU ZHOU, WEIZHE WANG, Shanghai Jiao Tong University — The unsteady flow field and flapping dynamics of an inverted flag in water channel are investigated using time resolved particle image velocimetry (TR-PIV) measurements. The dynamically deformed profiles of the inverted flag are determined by a novel algorithm that combines morphological image processing and principle component analysis. Instantaneous flow field, phase averaged vorticity, time-mean flow field and turbulent kinematic energy are addressed for the flow. Four modes are discovered as the dimensionless bending stiffness decreases, i.e., the straight mode, the biased mode, the flapping mode and the deflected mode. Among all modes, the flapping mode is characterized by large flapping amplitude and the reverse von Krmn vortex street wake, which is potential to enhance heat transfer remarkably.

¹National Natural Science Foundation of China

Yingzheng Liu
Shanghai Jiao Tong University

Date submitted: 25 Sep 2017

Electronic form version 1.4