Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Effect of Rotary Oscillations on the Coupled Vortex Wake of Two Cylinders. IZHAR KHAN, SANJAY KUMAR, Indian Institute of Technology Kanpur (IIT) — In the present investigation, we study the effects of rotational oscillations of the two cylinders in a side-by-side configuration at Reynolds number of 150 and spacing ratio, T/D = 4.0. The two cylinders are forced to oscillate in both in-phase and anti-phase configurations. The oscillation amplitude is varied from 0 to π radians and the normalized forcing frequency is varied from FR= 0 to 5, where FR is the ratio of forced oscillation frequency to the vortex shedding frequency of a single stationary cylinder. Planar laser induced fluorescence technique is used for visualization. Time and phase averaged PIV measurements are made to study the flow field quantitatively. It is observed that there is strong interaction between the wake vortices at resonant frequencies corresponding to maximum fluctuation intensity and a peak in the circulation. As FR is increased beyond 1.0, the wake structure switches from the coupled wake structure to the double row mode leading to a decrease in the interaction between the two vortex streets. A drag estimate is also made and it is observed that it gets amplified in the resonant frequency range and decreases significantly at higher frequencies compared to the case of two stationary cylinders at the same spacing.

Izhar Khan
Indian Institute of Technology Kanpur (IIT)

Date submitted: 09 Aug 2020 Electronic form version 1.4