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Investigation of the Wake Interactions in Tandem Cylinder Arrangements RAVI CHAITHANYA MYSA, ABOUZAR KABOUDIAN, RAJEEV KUMAR JAIMAN, Natl Univ of Singapore — Vortex-induced vibrations of a single cylinder in a cross-flow are compared with the wake-induced oscillations of the downstream cylinder of a tandem cylinder arrangement in a cross-flow. It is known that the synchronization of frequency of vortex shedding with the natural frequency of the structure leads to large amplitude motions. For larger reduced velocities beyond the lock-in region, the cylinder displacement is abruptly reduced due to the inertia dominated region where the frequency of vortex shedding is larger than the natural frequency of the structure. However, in the case of tandem cylinders, the large amplitudes of the downstream cylinder is found at the reduced velocities greater than that of lock-in region. In this work, we show that the wake from the upstream cylinder interacts with the downstream cylinder which influences the response of the coupled system. Extensive numerical experiments have been performed on a single cylinder and tandem cylinder arrangement in cross-flow. Here, the wake interactions in connection to the forces generated are systematically studied. The upstream cylinder is fixed and the downstream cylinder is free to oscillate in transverse direction.

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