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Control of vortex induced vibrations by suction and blowing K. MURALIDHARAN, B.S.V. PATNAIK, IIT Madras, Chennai - 600 036 — Kármán vortex shedding behind bluff bodies is of interest in a wide range of technological applications. Vortex shedding past a stationary D-cylinder is controlled in our earlier investigations [1]. However, a flexibly mounted circular cylinder gives rise to vortex induced vibrations. The control of these vibrations is of both fundamental and practical interest as fluid submerged structures need suppression of vortex induced oscillations. Flow past a circular cylinder is numerically simulated by coupling mass, momentum conservation equations along with dynamical equations for the structure. An active flow control strategy based on suction and blowing is designed and implemented to assess the efficacy of this control methodology. This is achieved by suitably located suction and blowing slots on the cylinder surface. These actuators are designed such that, the suction and blowing together results in zero mass injection. This system is found to effectively annihilate the vortex induced vibrations, when the quantum of actuations is about thrice the free stream velocity. The blowing slot is located on the leeward side of the cylinder, while the suction slots are positioned at an angle of 100° to the flow direction. The convective instability region is reduced, while the length of the wake formation region behind the body is controlled, with an attendant annihilation of the wake vortices.

[1] Patnaik BSV, Wei GW, Phy. Rev. Lett., **88**, 054502, (2002).

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