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Vortex-Induced Vibration of a Circular Cylinder Fitted with a Single Spanwise Tripwire EHSAN VAZIRI, ALIS EKMEKCI, University of Toronto — A spanwise tripwire can be used to alter the coherence and strength of the vortex shedding from cylindrical structures. While this has been well-documented for cylinders in stationary state, there exists a lack of understanding regarding the control induced by spanwise tripwires for cylinders undergoing vortex-induced vibration (VIV). The current experimental research investigates the consequences of spanwise tripping on VIV of a cylinder. Experiments are conducted in a recirculating water tunnel at a Reynolds number of 10,000. The test setup allows the rigid test cylinder to have one-degree-of-freedom vibration in the cross-flow direction as a result of fluid forcing. To measure the cylinder motion, a high-resolution laser displacement sensor is used. The tripwire diameter to cylinder diameter ratio is fixed at 6.1%. Various angular positions of tripwire are studied ranging from 40 to 90 degrees. It is shown that the tripwire location controls the pattern, amplitude, frequency, and mid-position of oscillations significantly. Different oscillation modes are classified based on the observed oscillation pattern, amplitude and frequency. Oscillation amplitude can be reduced by 61% with respect to the amplitude of a clean cylinder undergoing VIV under the same flow condition.

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