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Wind-induced response of 3 coupled flexible cylinders.[1] JANNETTE FRANDSEN, TEIS SCHNIPPER, Svend Ole Hansen ApS, SVEND OLE HANSEN, SOH Wind Engineering LLC — Wind-induced vibrations of 3 flexible circular cylinders have been measured in low turbulence flow conditions. The rigid cylinders are closely spaced and physically coupled giving rise to wake interactions. They are arranged in an equilateral triangle. The tests have been conducted on a section model elastically suspended for different angles-of-attack and spacing ratios. All results are based on self-excited structural responses for test cases of undamped and damped structures in the subcritical Reynolds no. range. Cross-flow Vortex/Wake-Induced Vibrations (VIV/WIV) in pure heave motion were identified. These were typically double responses resulting in a wide Strouhal no. range. Oscillation hysteresis contributed to the lowest onset. A special case related to torsion was also identified. The stability of the structure depends on the mass-damping parameter, the Scruton no. The Galloping-Induced Vibrations (GIV) are special cases identified because VIV and GIV couple when the Scruton no. is relatively low. When this coupling occurs, large vibrations develop. Thus, structural design, to include dampers, should assure that the Scruton no. is above a certain minimum value which has been identified to be substantially higher than the ones related to pure VIV/WIV cases.

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