

## The Cross-Flow Over a Pair of Staggered Cylinders

Stuart Price<sup>(1)</sup>, Michael Paidoussis<sup>(1)</sup>, Srikanth Krishnamoorthy<sup>(2)</sup>

(1) *McGill University, Montreal, Canada*

(2) *National Aerospace Labs, Bangalore, India*

An experimental investigation of the cross-flow past a pair of staggered circular cylinders, with the upstream cylinder subject to forced harmonic oscillation transverse to the flow direction, is presented. Flow-visualization and hot-film wake spectra are reported for Reynolds numbers, based on upstream velocity and cylinder diameter in the range  $1440 < Re < 1680$ . The longitudinal separation between cylinder centres is  $L/D = 2.0$ , with a transverse separation (for the mean position of the upstream cylinder) of  $T/D = 1.0$ . The oscillation of the upstream cylinder causes considerable modification of the flow patterns compared to what is obtained when the cylinder is fixed; depending on the frequency of oscillation, lock-in between the wake periodicity and the cylinder motion occurs. Indeed, two distinct types of wake synchronization are identified, where either the shear-layer shedding frequency or the frequency of the combined wake synchronize with the oscillation frequency.

[View the extended summary](#)