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Phase-Averaged Analysis of Three-Dimensional Vorticity in the Wake of Two Yawed Side-By-Side Circular Cylinders

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Abstract : The wake flow behind two yawed side-by-side circular cylinders is investigated using a three-dimensional vorticity probe. Four yaw angles (α), namely, 0°, 15°, 30° and 45° and two cylinder spacing ratios T* of 1.7 and 3.0 were tested. For T* = 3.0, there exist two vortex streets and the cylinders behave as independent and isolated ones. The maximum contour value of the coherent stream-wise vorticity is only about 10% of that of the spanwise vorticity. With the increase of α, increases whereas decreases. At α = 45°, is about 67% of. For T* = 1.7, only a single peak is detected in the energy spectrum. The span-wise vorticity contours have an organized pattern only at α = 0°. The maximum coherent vorticity contours of and for T* = 1.7 are about 30% and 7% of those for T* = 3.0. The independence principle (IP) in terms of Strouhal numbers is applicable in both wakes when α< 40°.

Keywords : circular cylinder wake, vorticity, vortex shedding, side-by-side
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