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Turbulent Characteristics of Wake Flows of Various Bridge Sections ROI GURKA, GREGORY KOPP, EMANUELA PALOMBI, University of Western Ontario, BOUNDARY LAYER WIND TUNNEL LABORATORY COLLABORATION — Deck geometry is one of the crucial factors that influence the flow characteristics and aeroelastic response of long-bridges. The wake flow patterns of bridge sections become increasingly important when exploring the interaction between the wind and the structure, as designs are becoming longer and lighter. PIV measurements involving flow around elongated cylinders, of various geometries, have been carried out in an open channel wind tunnel. The measurements were performed in the wake region and at the trailing edge. The cylinders tested have an elongation ratio of 7 with leading and trailing edge of distinct rectangular, triangular geometry. The cross-section of the fourth cylinder resembles to the design of the existing storebaelt bridge, found in Denmark. Reynolds stress profiles are presented along with normal stresses in the streamwise-normal plane at the wake region. Auto-correlation functions, as well as the spanwise vorticity are calculated and compared for the different geometries. The relationship that exists between the presence of a vortex street and its influence to the surrounding turbulent activity is demonstrated through these results. Orthogonal decomposition of the data sheds light on the dominant flow structures and on coherent motion interactions. The presented modes reveal the role of the strain field coupled with the vorticity in the wake region.

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