

Experimental Investigation of Flow Structure around a Rectangular Cylinder in Different Configurations

Authors : Cemre Polat, Dogan B. Saydam, Mustafa Soyler, Coskun Ozalp

Abstract : In this study, the flow structure was investigated by particle imaging velocimetry (PIV) method at $Re = 26000$ for two different rectangular cylinders placed perpendicular and parallel to the flow direction. After obtaining streamwise and spanwise velocity data, average vorticity, streamlines, velocity magnitude, turbulence kinetic energy, root mean square of streamwise and spanwise velocity fluctuations are calculated, and critical points of flow structure are explained. As a result of the study, it was seen that the vertical configuration has less effect on the flow structure in the back region of the body compared to the horizontal configuration. When the streamwise velocity component is examined in both configurations, it is seen that the negative velocity component is stronger on the long sides compared to the short sides. It has been observed that the vertically positioned cylinder expands the flow separation point compared to the horizontally positioned cylinder; also the vertical cylinder creates an increase in turbulence kinetic energy compared to the horizontal cylinder.

Keywords : bluff body, flow characteristics, PIV, rectangular cylinder

Conference Title : ICENFHT 2020 : International Conference on Experimental and Numerical Flow and Heat Transfer

Conference Location : Sydney, Australia

Conference Dates : December 03-04, 2020