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

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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 vertical 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

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1