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Effect of the cross sectional aspect ratio on the flow past a twisted cylinder[1] JAE HWAN JUNG, HYUN SIK YOON, Pusan National University — The cross-flow around twisted cylinders of cross sectional aspect ratio (A/B) from 1 to 2.25 is investigated at a subcritical Reynolds number (Re) of 3000 using large eddy simulation (LES). The flow past a corresponding smooth and wavy cylinder is also calculated for comparison and validation against experimental data. The effect of twisted surface assessed in terms of the mean drag and root-mean-square (RMS) value of fluctuating lift. The shear layer of the twisted cylinder covering the recirculation region is more elongated than those of the smooth and the wavy cylinder. Successively, vortex shedding of the twisted cylinder is considerably suppressed, compared with those of the smooth and the wavy cylinder. The maximum drag reduction of up to 13% compared with a smooth cylinder is obtained at a certain cross sectional aspect ratio. The fluctuating lift coefficient of the twisted cylinder is also significantly suppressed. We found that the cross sectional cross sectional aspect ratio (A/B) plays an essential role in determining the vortical structures behind the twisted cylinder which has a significant effect on the reduction of the fluctuating lift and suppression of flow-induced vibration.

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