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Large eddy simulation of the flow past a twisted cylinder¹ JAE HWAN JUNG, Department of Naval Architecture and Ocean Engineering, Pusan National University, HYUN SIK YOON, Global Core Research Center for Ships and Offshore Plants, Pusan National University, CHANG YOUNG CHOI, School of Mechanical Engineering, Pusan National University — Large eddy simulation of flow past a twisted cylinder has been carried out at a Reynolds number of 300 based on the cylinder diameter and the free stream velocity using finite volume method. The twisted cylinder has been formed by rotating the elliptic cross sectional area along the spanwise direction. For an ellipse, different eccentricities are considered to observe the effect of eccentricity on the flow fields. The excellent comparisons with previous studies for the cases of a smooth cylinder and a wavy cylinder having sinusoidal variation in cross sectional area along the spanwise direction guarantee the accuracy of present numerical methods. The instantaneous vortical structures in wake of the twisted cylinder are compared with those of the circular and wavy cylinders. In general, the shear layer of the twisted cylinder covering the recirculation region is more elongated than those of the circular and the wavy cylinders. Successively, vortex shedding of the twisted cylinder was considerably suppressed, compared with those of the circular and wavy cylinders. Consequently, the twisted cylinder achieved a large amount of the drag reduction and especially the significant suppression of the fluctuating lift coefficient.

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