

Abstract Submitted  
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**Enhancement of Turbulent Heat Transfer in Channel Flow Using a Rectangular Cylinder**<sup>1</sup> MAMORU SENDA, Doshisha University, Japan, DONG-HYEOG YOON, Inha University, KYUNG-SOO YANG, Inha University, Korea — The large-scale vortices shed from a cylindrical object as a vortex generator can be used to enhance heat transfer in a heat exchanger. In this study, Large-Eddy Simulation of turbulent heat transfer in channel flow with a rectangular cylinder at  $Re=3000$  (based on uniform inlet velocity and cylinder height) and  $Pr=0.7$  was performed with four distinct values of cylinder aspect ratio (horizontal to vertical,  $AR=0.5, 1.0, 2.0,$  and  $3.0$ ) to identify its effect on the heat transfer characteristics in the vicinity of the channel wall heated with constant heat flux. The rectangular cylinder is located on the centerline of the channel flow, causing flow separation and Karman vortices. Flow separates at the upstream edges of the cylinder, but it may reattach on the upper and lower faces of the cylinder for larger  $AR$ . Thus flow topology drastically alters across the threshold  $AR$ , implying significant change in flow characteristics such as turbulence intensity, wall shear stress, and secondary vortices in the vicinity of the channel walls, which in turn affect the heat transfer capacity on the channel walls. The effect of  $AR$  and the related flow physics are discussed in detail.

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