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Quantitative contribution of laminar, turbulence and secondary flow to velocity and temperature in rhombic ducts NAOYA FUKUSHIMA, Tokai University — In this study, Direct Numerical Simulation of turbulent flow in rhombic ducts have been carried out to investigate effects of the corner angle on the velocity and temperature distribution in the ducts. Due to anisotropy and inhomogeneity of the Reynolds stresses, secondary flow of the second kind, which goes from the center to the corner of ducts, are induced. The secondary flow affects the velocity and temperature distribution in the ducts and is supposed to enhance momentum and heat transfer. Even around the obtuse corner whose angle is 150^{o}, the secondary flow with about 1.5 % of bulk mean velocity is still induced. The origin of the secondary flow has not been clarified yet. Fukagata, Iwamoto and Kasagi (2002) have theoretically driven the FIK-identity to evaluate quantitative contributions of laminar and turbulence to the friction in turbulent channel. In this study, the FIK-identity has been numerically applied to DNS data in the rhombic ducts to evaluate quantitative contributions of laminar, turbulence and secondary flow to the velocity and temperature distribution. From the results, the effects of the corner angle on these contributions are investigated. Finally, one possible origin of the secondary flow will be suggested.

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