Measurement of Drag and Flow Characteristics on Riblet Plate in Turbulent Airflow

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Abstract

Measurements of the drag, streamwise velocity, turbulent intensity and Reynolds stress on a smooth plate and two kinds of riblet plates have been made in turbulent airflow. The riblet grooves were selected to form a triangle of depth 0.25mm and 0.125mm, and base length 0.5mm and 0.25mm. The Reynolds number of the airflow was changed in the range of $7.68\times10^5\sim2.23\times10^6$. The riblets yield 4.5% and 9.9% drag reduction compared to a smooth surface plate. The averaged streamwise velocity, turbulent intensity and the Reynolds stress over the riblet surface were shown to be smaller than those over the smooth surface plate. As a result, it was found that the turbulent energy on the riblet surface is controlled by the riblets.

Keywords: Riblet, Flat Plate, Drag Reduction, Flow Characteristic, Turbulent Airflow

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