ISSN Print: 1064-2277
ISSN Online: 2152-5102

International Journal of Fluid Mechanics Research

ASTFE
An Official Journal of the American Society of Thermal and Fluids Engineers

DOI: 10.1615/InterJFluidMechRes.2017016595
pages 131-153

ELUCIDATION OF LONGITUDINALLY GROOVED-RIBLETS DRAG REDUCTION PERFORMANCE USING PRESSURE DROP MEASUREMENTS

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ABSTRACT

The need to determine affordable and environmentally friendly methods of reducing skin friction can be identified as one of the reasons contributing towards the study of the effectiveness of riblet shapes. Water tank experiments were carried out to optimize the shape and dimensions of microstructure grooves over a flat plate. The use of organized microstructures on channel walls is proposed to obtain lower values of pressure losses on smooth walls. Three shapes of microstructure grooves were investigated, with same groove height (600 μm) and five spacing dimensions (600, 750, 1000, 1500 μm), in water flows with velocities of up to 0.4 m/s. This was done for all selected types of riblet, which are fixed with the direction aligned with the flow. The experimental results showed that the size and shape of the riblets can massively incubate some of the turbulent structures formed on the surface and that will lead to a more controllable flow environment, which can result in drag reduction.

KEY WORDS: pipelines, drag reduction, pressure drop, skin friction, riblets, geometry