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A Study of Laminar Drag Reducing Grooves A. MOHAMMADI, JERZY M. FLORYAN, University of Western Ontario — The performance of grooves capable of reducing shear drag in laminar channel flow driven by a pressure gradient has been analyzed. Only grooves with shapes that are easy to manufacture have been considered. Four classes of grooves have been studied: triangular grooves, trapezoidal grooves, rectangular grooves and circular-segment grooves. Two types of groove placements have been considered: grooves that are cut into the surface (they can be created using material removal techniques) and grooves that are deposited on the surface (they can be created using material deposition techniques). It has been shown that the best performance is achieved when the grooves are aligned with the flow direction and are symmetric. For each class of grooves there exists an optimal groove spacing which results in the largest drag reduction. The largest drag reduction results from the use of trapezoidal grooves and the smallest results from the use of triangular grooves for the range of parameters considered in this work. Placing the same grooves on both walls increases the drag reduction by up to four times when comparing with grooves on one wall only. The predictions remain valid for any Reynolds number as long as the flow remains laminar.

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