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Enhancement of gust using jet at trailing edge of airfoil: A novel technique DIPENDRA GUPTA, JAYWANT H. ARAKERI, Department of Mechanical Engineering, Indian Institute of Science, Bangalore — Sudden and sharp change in flow velocity, termed as a gust, is an important parameter to study flight performance, especially of micro-air vehicles (MAVs) and aircraft. There have been several techniques to create gusts in a wind tunnel including using pitching foils at the entrance of the test section. One conventional method is using two airfoils with a certain spacing to create a gust. The model aircraft to be tested is placed downstream between the pitching foils. The main limitation with this technique is the low gust intensity (I_g) that can be achieved. We propose a new method to enhance I_g using jet at the trailing edge of the pitching foils. Numerical simulation shows the gust intensity, using the proposed method, to increase by 2-7 times compared to that by conventional techniques for a particular Re , jet velocity and the range of reduced frequencies considered. Moreover, the spacing of foils ensures shear-free smooth flow in the near region surrounding the model, unlike some existing methods for gust enhancement. This technique provides a simple, economical and controlled way to study gust response of MAVs and aircraft in wind tunnels.

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