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论文

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### 平板/锯齿型Gurney襟翼对NACA0012翼型增升实验研究

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### Experimental Investigation of Lift Enhancement on a NACA0012 Airfoil Using Plate/Serrated Gurney Flaps

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摘要

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**摘要** 在Re为 $211 \times 10^6$ 情况下进行的NACA0012翼型Gurney襟翼增升效应风洞实验研究表明, Gurney襟翼可使升力有很大提高, 0.5%平均气动弦长襟翼在 $C_L > 11.0$ 后即可提供较高的升阻比, 当 $C_L = 11.35$ 时, 2%平均气动弦长襟翼获得了35%的最大升阻比增量; 翼型表面压力分布结果显示, Gurney襟翼增加了上翼面的吸力, 同时下翼面压力增强, 因而升力提高; 尾流速度型显示Gurney襟翼导致流经上翼面的流体在其后有明显下偏转, 这表明翼型有效弯度增大了; 襟翼上开出锯齿会同时导致升力和阻力下降, 但升阻比是否会提高则应视其是否更接近最佳高度的有效迎风面积。Gurney襟翼的最佳应用场合为中高升力系数情况(如起飞、降落等), 在中小升力系数情况下不宜使用。

**关键词:** 增升 翼型 Gurney襟翼 风洞实验

**Abstract:** An experimental wind-tunnel investigation was undertaken to determine the effects of Gurney flaps on a NACA0012 air foil at a chord Reynolds number of  $211 \times 10^6$ . In comparison with the clean configuration results, the Gurney flap increased the lift significantly. A higher lift-to-drag ratio was obtained by the 0.5% C flap when the lift-coefficient exceeds 11.0, and a maximum increment of lift-to-drag ratio was obtained by the 2% C flap at a lift-coefficient of 11.35. The pressure distribution results showed that the Gurney flap increased the suction of the upper surface and the pressure of the lower surface, and thus the total lift. The wake velocity profile indicated a significant down-turning of the stream over the upper surface of the airfoil, and this revealed that the camber of the airfoil was increased by the Gurney flap. When serrated, Gurney flaps produced less lift and drag than not serrated ones, but the variation of the lift-to-drag ratio at low lift-coefficient conditions depends on the effective area of the flaps. The Gurney flap should be employed at moderate to high lift-coefficient conditions such as takeoff and landing, while not advisable at low-to-moderate lift-coefficient conditions.

**Keywords:** lift enhancement airfoil Gurney flap wind tunnel tests

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