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昆虫级褶皱翼型的滑翔气动特性

Gliding aerodynamic characteristics of insect-size corrugated airfoils

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中文关键词: [褶皱](#) [蜻蜓翅](#) [气动力](#) [滑翔](#) [前缘涡](#)英文关键词: [corrugation](#) [dragonfly wing](#) [aerodynamic forces](#) [gliding](#) [leading edge vortex](#)

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中文摘要:

为了研究褶皱翼型上、下表面分别对气动力的影响, 在弦长雷诺数为1200, 攻角为 $0^\circ \sim 20^\circ$ 时, 采用有限体积法研究了褶皱翼型、光滑翼型、上表面光滑的褶皱翼型和下表面光滑的褶皱翼型的滑翔气动特性. 结果表明: 在一定攻角范围内, 褶皱翼型的升力系数较光滑翼型提高了10%; 只要翼型下表面是褶皱的, 产生的升力总大于下表面是光滑的, 下表面褶皱对升力的提高具有更大作用; 在大攻角下, 光滑的上表面更有利于提高升力; 在任何攻角时, 上、下表面褶皱对阻力影响很小.

英文摘要:

In order to investigate the effect of upper and lower surface corrugations on the aerodynamic forces respectively, the gliding aerodynamic characteristics of both surfaces of a corrugated airfoil were studied at chord Reynolds number of 1200 when the angle of attack (AOA) varied from 0° to 20° with the finite volume method, compared with the smooth airfoil, corrugated airfoil with the smooth upper surface and corrugated airfoil with the smooth lower surface. The computed results indicate that the lift coefficient of corrugated airfoil improves by 10% than that of smooth airfoil. Within a suitable AOA, the lift of an airfoil with corrugated lower surface is always higher than that of an airfoil with smooth lower surface. The corrugation of lower surface play more important role of increasing the lift. At high AOA, a smooth upper surface increases the lift than a corrugated one. The corrugation of both upper and lower surfaces has little effect on the drag.

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