

双翼振动的预处理数值方法和性能研究(二)

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摘 要: 本文利用非定常双时间 NS 方程的预处理方法对摆翼地效推进器进行了推力和推进性能的分析, 结果显示沉浮振动的推力和效率与速度的变化关系表现出一致性; 固定频率, 改变速度, 发现推力和效率存在极大值点; 随着频率增大, 极大值点右移。最大推力和效率的动力攻角为 $6^\circ \sim 9^\circ$, 利用速度矢量图和压力云图显示了分离涡的输运和扩散, 再一次展示了地效的存在。

关键词: NS 方程, 翼形振动, 地效推进技术。

Preconditioning Numerical Method and Performance Investigation of Plunging Dual-Foils (2)

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Abstract: This paper employs the preconditioning method for unsteady dual-time NS equations to evaluate and analyze the performance of symmetrical plunging dual-foils. The result shows that the trend of efficiency and thrust versus speed agreed well with previous experimental measurement. With a fixed frequency and changing speed, the maximum thrust and efficiency was obtained and with the increase of frequency the maximum thrust and efficiency shifted rightward. These dynamic angles of attack corresponding to the maximum points of thrust and efficiency fall in between 6 to 9 degrees. The vector graph and pressure nephogram showed the transportation and diffusion of vortex separation, revealed that the wing-in-ground effect occurred when dual-foils symmetrically plunging, and this resulted in an increase of averaged thrust and efficiency.

Key words: NS equations, plunging foil, ground effect propulsion.