

Abstract Submitted
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The Vortices Trapped above Low-aspect-ratio Wings JIAN TANG

— A stationary vortex trapped above the nondelta, low-aspect-ratio wings was first obtained in 3D unsteady numerical simulation. Flow visualization was conducted in water-channel using hydrogen bubble. The results verify that there is a vortex trapped above the low-aspect-ratio wings and the stationary vortex is consisted of two semi-ball, anti-rotation vortices which are different from the leading edge vortices on the delta wing. This stationary vortex trapped above the nondelta, low-aspect-ratio wings is a new phenomenon, which is different from the leading edge vortex on the delta wing. The numerical results show that lift coefficient increase to 0.8 when incidence increases from 0° to 30° , the lift coefficient keeps this value up to 45° —a very high stall angle. The numerical results indicate that the trapped vortex might be the source of the high stall angle of attack and nonlinear lift at high incidence. Accompanied with the low-aspect-ratio wing, the existence of the stationary vortex is thought to be related to the strong effects of tip vortices. Further experimental and numerical works have been undertaken, the results show that trapped vortices have variant shapes and different critical angles of attack.

Jian Tang

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