

Control of Vortical Flow on Supersonic Aircraft at Low Speed

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Vortical flow generated on the supersonic aircraft was control by flap and canard to improve aerodynamic performance at low speed. Numerical simulation provided details of flow structure and helped to investigate physical phenomena. It was shown that the nonlinear characteristics of lift and pitching moment were resulted from vortex breakdown and interaction of vortices separated from the leading edge of the wing. The leading-edge flap was applied to control separation vortices and thus improve the aerodynamic performance. It was indicated by numerical simulation that the separation vortices were largely suppressed on the leading-edge flap. The canard was found to have favorable effects of vortex interference on the aerodynamic performance and result in delay of the nonlinearity of the pitching moment to improve the longitudinal stability.

Keywords: Flow control, Vortical flow, Nonlinearity, Numerical simulation, Supersonic aircraft