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STUDIES ON AERO THERMODYNAMICS PERFORMANCE OF THE RUDDER WITH ZERO SWEEPBACK IN ARC HEATED TUNNEL

Abstract

The experimental studies on aero thermodynamic performance of the rudder with zero sweepback were conducted in arc wind tunnel. The cold wall heat fluxes on the rudder, including on the leading edge, the surface of the rudder and the top chord, with zero sweepback angle were measured. The experimental results showed the maximum cold heat flux lied on the leading edge and the cold wall flux on the top chord was higher than that on the surface of the rudder. The latter above was inconsistent with the genuine flying tests. In order to explain the inconsistent phenomenon above, the numerical simulation was carried out in arc heated tunnel, which wad consistent with the ablation results. That indicated that flow reattachment occurred on the top chord which made the cold wall heat flux higher than that on the surface of the rudder.