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Effects of streamline curvature on separation prediction SUNIL K. AROLLA, PAUL A. DURBIN, Department of Aerospace Engineering, Iowa State University — In this study, the effects of streamline curvature on prediction of flow separation are investigated. The geometry is a circulation control airfoil, a high-lift configuration that has been under extensive research for more than two decades. A tangential jet is blown over a thick, rounded trailing edge, using the Coanda effect to delay separation. An attempt is made to understand, through numerical simulations, the dynamics of turbulent separation and reattachment on the Coanda surface. Highly curved, attached recirculation regions are seen to form. A physics based curvature correction proposed by Pettersson-Reif et al. (1999) is used in conjunction with $\zeta - f$ turbulence model. The chord-based Reynolds number is $Re = 10^6$. Two jet momentum coefficients of $C_\mu = 0.03$ and 0.1 are computed. In this paper, comparisons between the computed and experimental pressure distributions, velocity profiles and the position of flow detachment are presented. Comparisons with other closures such as Menter's SST model are also discussed.

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