بسمه تعالی

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Consider the "cambered," diamond-shaped airfoil exposed to a Mach 2.00 stream in a wind tunnel (Fig. P10.10). For the wind tunnel, $p_{t1} = 125$ psia $T_t = 650°$R. The airfoil is such that $\delta_2 = 8°, \delta_3 = 2°$; the maximum thickness t equals to $0.07c$ and is located at $x = 0.40c$. The angle of attack is 10°.

(a) Using the shock-wave relations where applicable and the isentropic expansion relations (Prandtl-Meyer) where applicable, calculate the pressures in regions 2 through 5.

(b) Using the linear-theory relations, calculate the pressures in regions 2 through 5.

(c) Calculate C_A, C_N, C_l, C_d, and $C_{m_{0.5c}}$ for this configuration. C_A is the axial force coefficient for the force along the axis (i.e., parallel to the chordline of the airfoil) and C_N is the normal force coefficient (i.e., normal to the chordline of the airfoil).

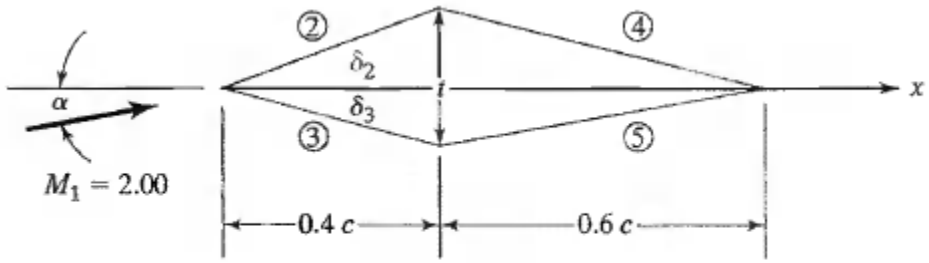

Figure P10.10