

### Solution to Problem 352 E

The Mach wave that results from attaching a slender probe to the front of the wedge allows us to determine the Mach number of the flow:

$$M = \frac{1}{\sin \mu} = \frac{1}{\sin 45^\circ} = \sqrt{2}$$

Based on this Mach number and the observed oblique shock angle,  $\beta$ , of  $60^\circ$ , we find the deflection angle,  $\theta$ , from the  $\theta$ - $\beta$ - $M$  relation:

$$\begin{aligned} \tan \theta &= 2 \cot \beta \left[ \frac{M^2 \sin^2 \beta - 1}{M^2(\gamma + \cos 2\beta) + 2} \right] \\ &\Rightarrow \theta = 8.64^\circ \end{aligned}$$

The wedge angle,  $\delta$ , will be twice this deflection angle.

$$\delta = 2\theta = 17.3^\circ$$