

An Empirical Expression for Maximum Cone Angle for Attached Shock at Supersonic Mach Numbers

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IN the following an empirical expression is given for the maximum cone angle for an attached shock at a given freestream Mach number in explicit form:

$$\gamma \sin^2 \theta_m = 1 - \frac{1.66811133}{M^2} - \frac{1.80290197}{M^4} + \frac{13.5947703}{M^6} - \frac{28.844018}{M^8} + \frac{27.247824}{M^{10}} - \frac{9.527563}{M^{12}} \quad (1)$$

where θ_m = semivertex angle of cone, γ = ratio of specific heats = 1.405, M = freestream Mach number.

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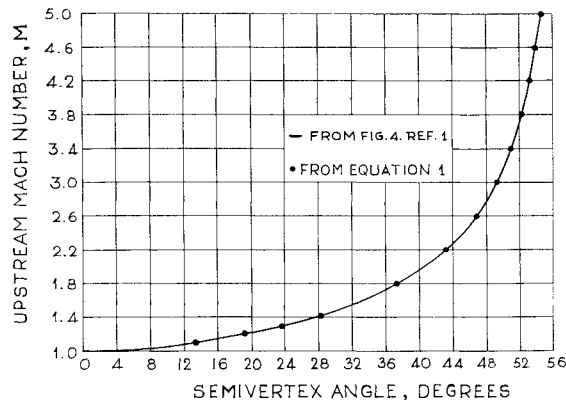


Fig. 1 Maximum cone angle vs Mach number for attached shock.

The calculated values compare very well with the curve given in Fig. 4 in Ref. 1 (see Fig. 1), the difference being less than one tenth of a degree.

Reference

¹ "Equations, Tables, and Charts for Compressible Flow," Rept. 1135 NASA.