Conical Flow
Air flow over a cone at Mach 3, as a function of cone half angle.

20 deg.

30 deg.

40 deg.

50 deg.

55 deg.

60 deg.

70 deg.
Basic Physics

\[ \delta < \sigma \]

\[ \beta \]

\[ \sigma \]
WEDGE
- Use $M-\beta-\delta$ to find wave angle $\beta$. $\delta$ given by wedge angle.
- Find $M_{1n} = M_1 \sin \beta$
- Use NS tables to find conditions at 2, which are same as at wedge.

CONE
- Need $M-\beta-\sigma$ relationship to find $\beta$
- Use $M-\beta-\delta$ to find $\delta$ and $M_{1n} = M_1 \sin \beta$ and NS tables to find conditions at 2.
- Need additional relations to find conditions at ‘c’
No strong shocks

CHART 5
CHART 6

Pressure Coefficient on Cone $C_{pc}$ vs Cone Angle $\sigma$

- Cone angle $\sigma$ ranges from 0 to 56.
- Pressure Coefficient $C_{pc}$ ranges from 0 to 1.8.

Legend:
- $M_1$: Supersonic speed
- $\sigma$: Cone angle

Graphical representation showing the relationship between the cone angle and the pressure coefficient under supersonic conditions.
Example

\[ M_\infty = 2, \ 60,000\text{ft} \]
\[ (T_\infty = 217\text{K,} \]
\[ p_\infty = 7\text{kPa}) \]

Find \( T, p \) and \( M \) on the surface of the nose-cone and the Mach number just downstream of the shock.