Oblique Conical Shocks

• Found in many aircraft applications.
• A conical ramp is used to generate an oblique shock, which decelerate flow to a less supersonic conditions.
• A normal shock further decelerates the flow to a subsonic condition for the internal flow in the diffuser.
Oblique Conical Shocks
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CONICAL
\( \gamma = 1.40 \)

Weak

\( \delta = 0^\circ, 10^\circ, 15^\circ, 20^\circ, 25^\circ, 30^\circ, 35^\circ, 40^\circ, 45^\circ \)

\( M_{x}, \) Surface Mach Number

0.5

1.0

1.5

2.0

2.5

3.0
Oblique Conical Shocks

\[ \frac{p_w}{p_0}, \text{ Surface Total Pressure Ratio} \]

\[ M_i, \text{ Incoming Mach Number} \]

\[ \gamma = 1.40 \]

\[ \delta = 0^\circ \]

Graph showing the relationship between surface total pressure ratio and incoming Mach number for oblique conical shocks with various angles.
Ex 1: Oblique Conical Shock

A diffuser on a Mach 2 aircraft operates with one oblique conical and one normal shock outside of the inlet at STP. If the turning angle is 20° and the internal diffuser recovery factor is 0.90, what is the diffuser exit total temperature and the total pressure recovery from the freestream to the diffuser exit on the spike?