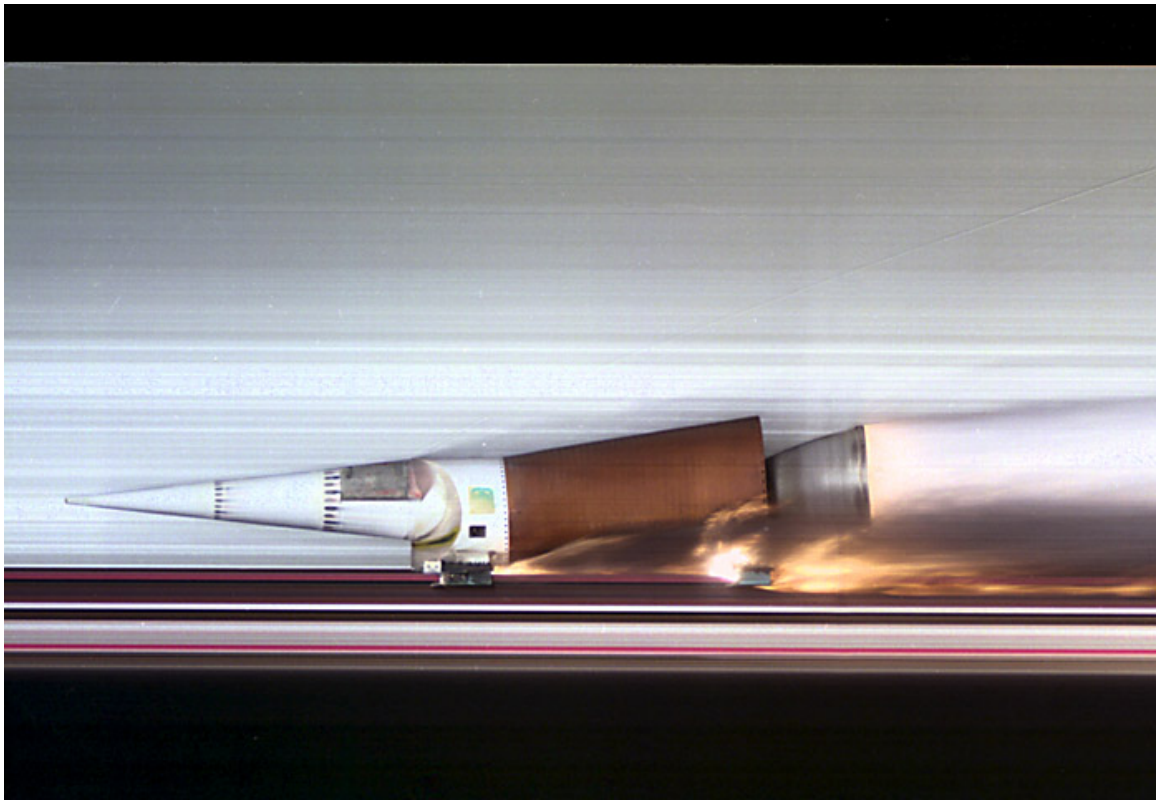
# Compressible Flow – Speed of Sound and the Mach Cone

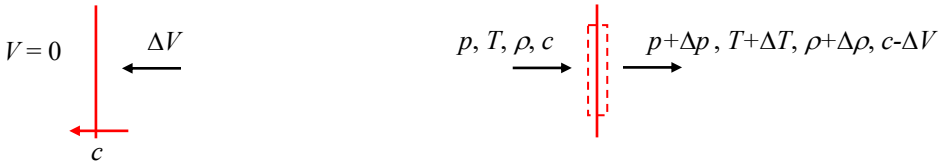


**(rocket sled traveling at 3300 mph)**

# Compressible Flow – Speed of Sound and the Mach Cone

**Speed of Sound**

speed of sound = speed at which an infinitesimally weak pressure wave propagates




Apply COM and the LME in the horizontal direction:

$$c^2 = \frac{\Delta p}{\Delta \rho}\left(1 + \frac{\Delta \rho}{\rho}\right)$$

For an isentropic process,

$$c^2 = \left.\frac{\partial p}{\partial \rho}\right|_s$$

For an ideal gas,

$$c = \sqrt{kRT}$$

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**The Mach Cone**