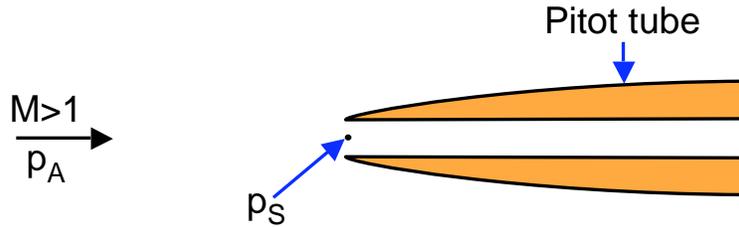


Problem 334B

A pitot tube (which senses the stagnation pressure, p_S , at its mouth) is usually incorporated into the nose of a supersonic airplane ($M > 1$) for the purpose of measuring the speed at which the airplane is travelling. Indeed, the ratio of the stagnation pressure, p_S , to the ambient pressure, p_A , of the oncoming flow is directly related to the Mach number, M :



As a part of the process by which the flow transitions from $M > 1$ far upstream to zero velocity at the stagnation point, a bow shock (a normal shock wave) forms upstream of the pitot tube. If the Mach number $M = 2.5$, find the pressure ratio, p_S/p_A . (Assume the ratio of specific heats, $\gamma = 1.4$).