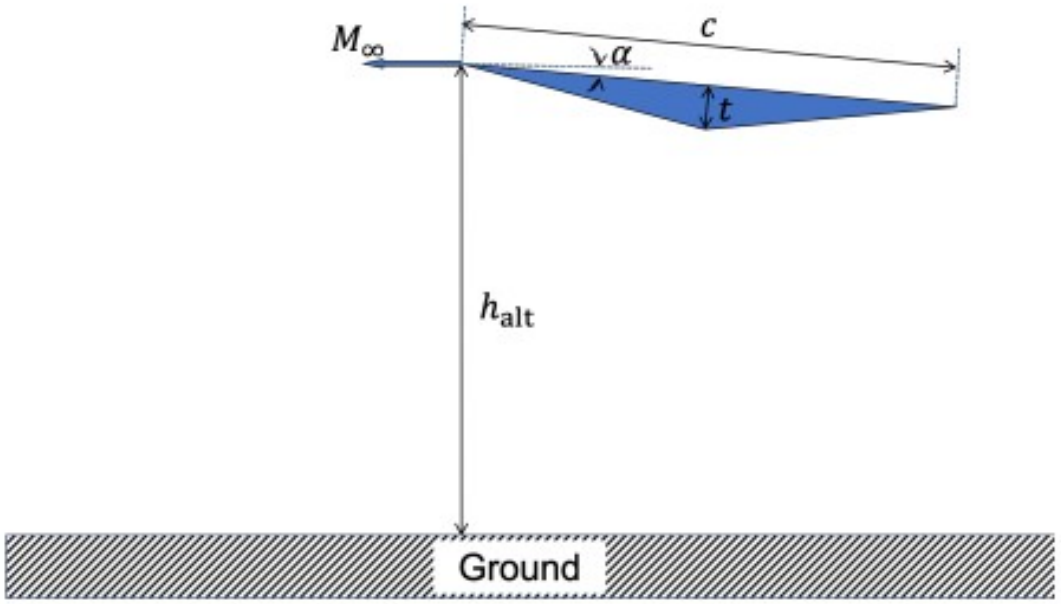

For simplicity, all waves in this problem will extend uniformly until they hit another surface (i.e., the ground for this problem). Any wave interaction(s) will not be considered.

Given that $M_\infty = 3$, $\alpha = 5°$, $c = 20$ m, $\tan^{-1}(2t/c) = 10°$, and $h_{\text{alt}} = 15$ m:

(a) Solve the pressure exerted on all 3 faces of the aircraft.

(b) After the trailing edge, the flow from the upper side and that from the lower side are required to have the same pressure for the conservation of momentum. The Mach number, however, may not have to be the same, so the upper and lower streams will essentially remain distinct, separated by a so-called "slip line".

Determine the angle of the slip line and the 2 oblique shock angles at the upper and lower sides of the aircraft trailing edge relative to the ground surface.

NOTE: The problem here may be solved by treating: (i) the trailing edge as the intersection point of 2 oblique shocks induced by a top and bottom compression corner; and (ii) the 2 trailing oblique shocks as the refraction of the 2 intersecting oblique shocks. See more details on the next page. Also, the problem may be easier to solve on the body axis of the aircraft.

(c) Sketch the pressure distribution on the ground surface for the instant depicted in the figure above.

How many boom(s) would you expect to hear? Is your answer expected? Discuss.