

HW 8: Due 4/9/04

1. Wind at a velocity U_o and pressure p_o flows past a Quonset hut which is a half cylinder of radius 2 m and length $L = 5$ m. The internal pressure, p_i , in the hut is 101.6 kPa and the far field pressure, p_o , is also 101.6 kPa.
 - (a) Assuming incompressible Euler flow, find the uplift force on the hut for wind velocities from 0 kph to 100 kph.
 - (b) What happens to the uplift forces if we change the shape of the hut cross-section from a semi-circle to a square with the same volume?
 - (c) In very strong winds the forces in part (a) can become quite large. Suppose that a hole is introduced in the hut roof at a point A to make p_i equal to the surface pressure there. At what angle θ should hole A be placed to make the uplift force zero? Does the location change with velocity?

