



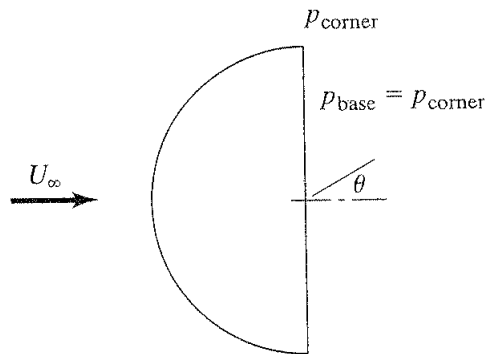
مبانی آیرودینامیک

تمرین تحویلی شماره ۶

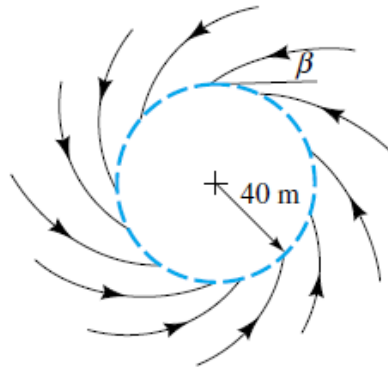
مدرس: دکتر احسان روحی

مهلت تحویل: ۱۳۹۴/۹/۱

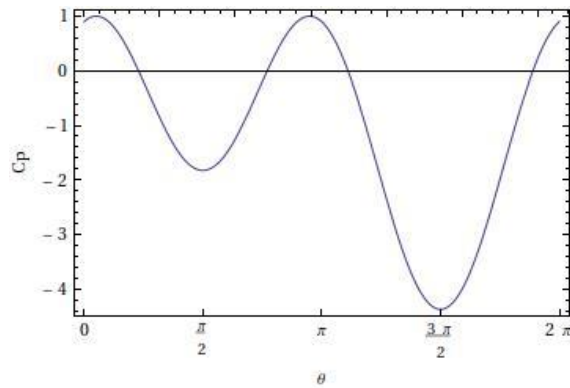
- 1- Consider an incompressible flow around a semi-cylinder, as shown below. Assume that the velocity distribution for the windward surface of the cylinder is given by the inviscid solution, and that the base pressure ( $p_{\text{base}}$ ) on the flat leeward surface is equal to the pressure at the separation point ( $p_{\text{corner}}$ ). Calculate the lift and drag coefficients.



- 2- Let the vortex/sink flow combination simulate a tornado. Suppose that the circulation about the tornado is  $\Gamma = 8500 \text{ m}^2/\text{s}$  and that the pressure at  $r = 40 \text{ m}$  is 2200 Pa less than the far-field pressure. Assuming inviscid flow at sea-level density, estimate
- (a) The appropriate sink strength  $_m$ ,
  - (b) The pressure at  $r = 15 \text{ m}$ , and
  - (c) The angle  $\beta$  at which the streamlines cross the circle at  $r = 40 \text{ m}$



- 3- Based on the diagram below of the coefficient of pressure around the cylinder, which direction is the lift force? Explain.



- 4- If the velocity components are given by:  
 $u = -Cy/(x^2+y^2)$        $v = Cx/(x^2+y^2)$

What is the circulation around the circuit shown in the figure below?

