

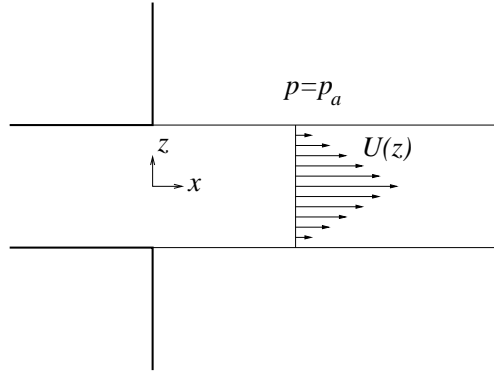
MAE 210C – FLUID MECHANICS III – SPRING 2017

HOMEWORK ASSIGNMENT # 4 (Due at 9:00AM on Monday May 22, 2017)

Problem 1 The triangular velocity profile defined by

$$U = 1 - |z| \text{ for } |z| \leq 1 \quad \text{and} \quad U = 0 \text{ for } |z| > 1$$

is proposed as an approximate representation of the velocity across a **liquid sheet discharging into air**. In order to investigate the temporal **inviscid** stability of this flow, integrate Rayleigh's equation to obtain explicit expressions for the phase velocity ω_r/k and growth rate ω_i . Consider separately the sinuous and varicose modes.



Problem 2 The velocity across a wall jet can be approximated by

$$U = z \text{ for } 0 \leq z \leq 1, \quad U = 2 - z \text{ for } 1 \leq z \leq 2, \quad \text{and} \quad U = 0 \text{ for } z > 2.$$

Use Rayleigh's equation to analyze the temporal **inviscid** stability of this flow.

