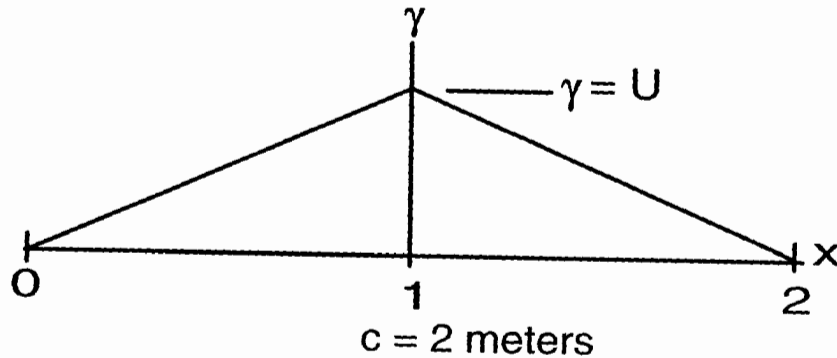


### 13.024 Problem Set 5:

## Numerical Marine Hydrodynamics – Spring Term, 2003

Due: March 18, 2003

### Problem 1



Suppose a very thin 2D airfoil or hydrofoil section has a circulation distribution as drawn above.

- Write and run a computer program that determines the shape of the foil.
- Add to the above program a part that computes the lift coefficient of the foil.
- Determine the total circulation around the foil, either analytically or numerically and determine the lift coefficient associated with this circulation. Compare this lift coefficient with the value you computed in part B.

### Problem 2.

- In Problem Set 2 you calculated an expression for the velocity potential on the surface of a cylinder. Use MATLAB to make graphs of the perturbation potential vs angle. The perturbation potential is the total potential minus the potential of the incoming free stream. Consider a cylinder with a radius of 1 meter and an incoming stream speed of 1 m/s. Plot the potential on the vertical axis of the graph and angle on the horizontal axis.
- Also plot the total potential vs angle. Keep copies of these graphs to use for comparison when you compute the potential by panel methods later in the term.