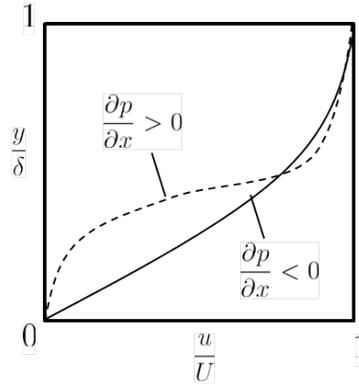


MIT Department of Mechanical Engineering  
2.25 Advanced Fluid Mechanics

**Problem 9.03**

*This problem is from "Advanced Fluid Mechanics Problems" by A.H. Shapiro and A.A. Sonin*



Consider a laminar boundary layer or the laminar sublayer of a turbulent boundary in two-dimensional flow. The fluid is incompressible and has constant viscosity.

Show that, at the wall, the velocity profile is concave upwards in flow with a favorable pressure gradient ( $\partial p/\partial x < 0$ ). Whereas it is concave downwards for flow with an unfavorable pressure gradient ( $\partial p/\partial x > 0$ ).

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