

Problem 240A

Consider the long thin racing boats used in competitive rowing events. Assume that the major component of resistance to motion is the skin friction drag on the hull of the boat. Estimate this drag force for any velocity, U , by assuming that

1. the hull/water interface is like a flat plate with a length of 10 m and a width of 1 m .
2. that the boundary layer on the hull remains laminar (even though in practice this would not be the case) and unseparated.

The water density and kinematic viscosity are respectively 1000 kg/m^3 and $10^{-6} m^2/s$.

If the boat is propelled by eight humans each capable of a rate of output of work of 0.1 HP (1 $HP = 746 kg m^2/s^3$) and if half of this energy is uselessly dissipated in the rowing process what would be the top speed of the boat?