
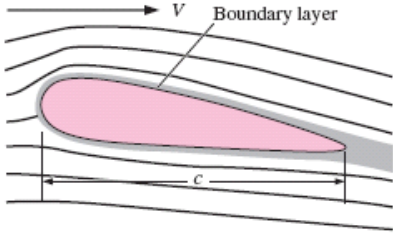
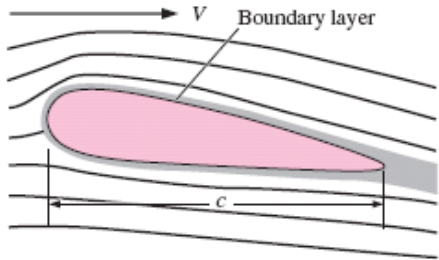


Page No	Current version	Corrected version
553	<p>10-31E  A slipper-pad bearing with linearly decreasing gap height (Fig. P10-23) is being designed for an amusement park ride. Its dimensions are $h_0 = 1/1000$ in (2.54×10^{-5} m), $h_L = 1/2000$ in (1.27×10^{-5} m), and $L = 1.0$ in (0.0254 m). The lower plate moves at speed $V = 10.0$ ft/s (3.048 m/s) relative to the upper plate. The oil is engine oil at 40°C. Both ends of the slipper-pad are exposed to atmospheric pressure, as in Prob. 10-30. (a) Calculate the convergence α, and verify that $\tan \alpha \approx \alpha$ for this case. (b) Calculate the gage pressure halfway along the slipper-pad (at $x = 0.5$ in). Comment on the magnitude of the gage pressure. (c) Plot P^* as a function of x^*, where $x^* = x/L$ and $P^* = (P - P_{\text{atm}})h_0^2/\mu VL$. (d) Approximately how many pounds of weight (load) can this slipper-pad bearing support if it is $b = 6.0$ in deep (into the page of Fig. P10-23)?</p>	<p>10-31 A slipper-pad bearing with linearly decreasing gap height (fig. P10-23) is being designed for an amusement park ride. Its dimensions are $h_0 = 2.54 \times 10^{-5}$ m, $h_L = 1.27 \times 10^{-5}$ m, and $L = 0.0254$ m. The lower plate moves at speed $V = 3.048$ m/s relative to the upper plate. The oil is engine oil at 40°C. Both ends of the slipper-pad are exposed to atmospheric pressure, as in Pro. 10-30. (a) Calculate the convergence α, and verify that $\tan \alpha \approx \alpha$ for this case. (b) Calculate the gage pressure halfway along the slipper-pad (at $x = 1.27$ cm). Comment on the magnitude of the gage pressure. (c) Plot P^* as a function of x^*, where $x^* = x/L$ and $P^* = (P - P_{\text{atm}})h_0^2/\mu VL$. (d) Approximately how many kilograms of weight (load) can this slipper-pad bearing support if it is $b = 15$ cm deep (into the page of Fig. P10-23)</p>
557	<p>10-71E Water flows over the fin of a small underwater vehicle at a speed of $V = 6.0$ mi/h (Fig. P10-71E). The temperature of the water is 40°F, and the chord length c of the fin is 1.6 ft. Is the boundary layer on the surface of the fin laminar or turbulent or transitional?</p>	<p>10-71 Water flows over the fin of a small underwater vehicle at a speed of $V = 9.5$ km/h (Fig. P10-71). The temperature of the water is 4.5°C, and the chord length c of the fin is 0.5 m. Is the boundary layer on the surface of the fin laminar or turbulent or transitional.</p>
557	 <p>FIGURE P10-71E</p>	 <p>FIGURE P10-71</p>
557	<p>10-73E Air flows through the test section of a small wind tunnel at speed $V = 7.5$ ft/s. The temperature of the air is 80°F, and the length of the wind tunnel test section is 1.5 ft. Assume that the boundary layer thickness is negligible prior to the start of the test section. Is the boundary layer along the test section wall laminar or turbulent or transitional? <i>Answer: laminar</i></p>	<p>10-73 Air flows through the test section of a small wind tunnel at speed $V = 2.3$ m/s. The temperature of the air is 27°C, and the length of the wind tunnel test section is 0.45 m. Assume that the boundary layer thickness is negligible prior to the start of the test section. Is the boundary layer along the test section wall laminar or turbulent or</p>

		transitional. <i>Ans: laminar</i>
558	<p>10-79E For the small wind tunnel of Prob. 10-73E, assume the flow remains laminar, and estimate the boundary layer thickness, the displacement thickness, and the momentum thickness of the boundary layer at the end of the test section. Give your answers in inches, compare the three results, and discuss.</p>	<p>10-79 For the small wind tunnel of Prob. 10-73, assume the flow remains laminar, and estimate the boundary layer thickness, the displacement thickness, and the momentum thickness of the boundary layer at the end of the test section. Give your answers in cms, compare the three results, and discuss.</p>
558	<p>10-85E A small, axisymmetric, low-speed wind tunnel is built to calibrate hot wires. The diameter of the test section is 6.0 in, and its length is 10.0 in. The air is at 70°F. At a uniform air speed of 5.0 ft/s at the test section inlet, by how much will the centerline air speed accelerate by the end of the test section? What should the engineers do to eliminate this acceleration?</p>	<p>10-85 A small, axisymmetric, low-speed wind tunnel is built to calibrate hot wires. The diameter of the test section is 15cm and its length is 25cm. The air is at 21°C. At a uniform air speed of 1.5m/s at the test section inlet, by how much will the centerline air speed accelerate by the end of the test section? What should the engineers do to eliminate this acceleration?</p>
558	<p>10-86E Air at 70°F flows parallel to a smooth, thin, flat plate at 15.5 ft/s. The plate is 10.6 ft long. Determine whether the boundary layer on the plate is most likely laminar, turbulent, or somewhere in between (transitional). Compare the boundary layer thickness at the end of the plate for two cases: (a) the boundary layer is laminar everywhere, and (b) the boundary layer is turbulent everywhere. Discuss.</p>	<p>10-86 Air at 21°C flows parallel to a smooth, thin, flat plate at 4.7m/s. The plate is 3.2m long. Determine whether the boundary layer on the plate is most likely laminar, turbulent, or somewhere in between (transitional). Compare the boundary layer thickness at the end of the plate for two cases: (a) the boundary layer is laminar everywhere, and (b) the boundary layer is turbulent everywhere. Discuss.</p>