

**FIGURE P11-4**

Problem 11-9 to 11-10

- †11-28 Use the information in Problem 11-9 to find the torque needed to drive the crank at the position shown using the method of virtual work.
- 11-29 Use the information in Problem 11-9 and program FOURBAR to find and plot all pin forces and the torque needed to drive the crank at a constant speed of 10 rad/sec for one revolution of the crank.
- †11-30 Use the information in Problem 11-9 to find and plot the torque needed to drive the crank at a constant speed of 10 rad/sec for one revolution of the crank using the method of virtual work.

FOR REFERENCE

- ‡11-9 Figure P11-4a shows a fourbar linkage and its dimensions in meters. The steel crank and rocker have uniform cross sections of 50 mm wide by 25 mm thick. The aluminum coupler is 25 mm thick. In the instantaneous position shown, the crank O_2A has $\omega = 10$ rad/sec and $\alpha = 5$ rad/sec². There is a vertical force at P of $F = 100$ N. Find all pin forces and the torque needed to drive the crank at this instant.