



- 11-37 Use the information in Problem 11-12 to find the torque needed to drive the crank at the position shown using the method of virtual work.
- 11-38 Use the information in Problem 11-12, but change the length of link 4 to 1.86 m to make it Grashof. Then use 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.
- 11-39 Use the information in Problem 11-12, but change the length of link 4 to 1.86 m to make it Grashof. Then find and plot the torque needed to drive the crank at a constant speed of 10 rad/sec for one revolution of the crank. Change the length of link 4 to 1.86 m.

FOR REFERENCE

- 11-12 Figure P11-5b (above) shows a fourbar linkage and its dimensions in meters. The steel crank, coupler, and rocker have uniform cross sections of 50 mm diameter. In the instantaneous position shown, the crank O_2A has $\omega = -10$ rad/sec and $\alpha = 10$ rad/sec². There is a horizontal force at P of $F = 300$ N. Find all pin forces and the torque needed to drive the crank at this instant.