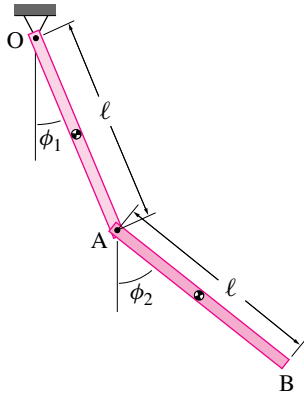


18.5 Advanced kinematics of planar motion

18.5.1 Double pendulum. The double pendulum shown is made up of two uniform bars, each of length ℓ and mass m . At the instant shown, ϕ_1 , $\dot{\phi}_1$, ϕ_2 , and $\dot{\phi}_2$ are known. For the instant shown, answer the following questions in terms of ℓ , ϕ_1 , $\dot{\phi}_1$, ϕ_2 , and $\dot{\phi}_2$.

- What is the absolute velocity of point A ?
- What is the velocity of point B relative to point A ?
- What is the absolute velocity of point B ?



Problem 18.5.1

18.5.2 Double pendulum, Again. For the double pendulum in problem 18.5.1, $\ddot{\phi}_1$ and $\ddot{\phi}_2$ are also known at the instant shown. For the instant shown, answer the following questions in terms of ℓ , ϕ_1 , $\dot{\phi}_1$, $\ddot{\phi}_1$, ϕ_2 , $\dot{\phi}_2$, and $\ddot{\phi}_2$.

- What is the absolute acceleration of point A ?
- What is the acceleration of point B relative to point A ?
- What is the absolute acceleration of point B ?