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Question: 7-13 There is another formulation of the equations of motion of \cdots

7-13 There is another formulation of the equations of motion of a mechanical system that is useful, the so-called **Hamiltonian** formulation. Define the Hamiltonian function H by

$$H = \sum_{k=1}^{n} \dot{q}_k p_k - L$$

- (a) Show that H = K + V.
- (b) Using the Euler-Lagrange equations, derive Hamilton's equations

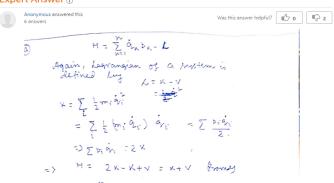
$$\dot{q}_k = \frac{\partial H}{\partial p_k}$$

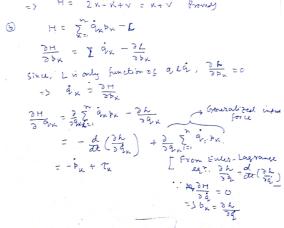
 $\dot{p}_k = -\frac{\partial H}{\partial q_k} + \tau_k$

where τ_k is the input generalized force.

(c) For two-link manipulator of Figure 7.8 compute Hamiltonian equations in matrix form. Note that Hamilton's equations are a system of first order differential equations as opposed to a second order system given by Lagrange's equations.

Expert Answer ①

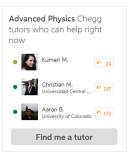




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