

淡江大學九十一年度日間部轉學生招生考試試題

系別：物理學系三年級

科目：理論力學

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計算機
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本試題共 / 頁

1. A particle of mass m moves in a three dimensional central potential $V(r) = Kr^4$, where $K > 0$. The particle is moving in a circle of radius r_0 .
 - (a) Calculate the energy E and the angular momentum L of the particle.
 - (b) Calculate the period of small radial oscillation when the particle is slightly disturbed from the circular orbit.

2. Consider a thin sheet of an equilateral triangle of mass M and each side of length L . It swings freely about an axis passing through the vertex O and perpendicular to the sheet as shown in Fig. I.
 - (a) Find the moment of inertia of the sheet about O .
 - (b) Find the period for small oscillations of the sheet as a compound pendulum.

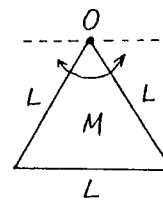


Fig. I

3. A ball of mass m moving with a speed of u_1 strikes a bar of mass M moving to the right, with the center-of-mass speed v_1 as shown in Fig. II. Assume that the plane in which this collision takes place is smooth, and that the ball sticks to the bar after collision. Find the speed u_2 of the ball and the speed v_2 of the center-of-mass of the bar just after collision.

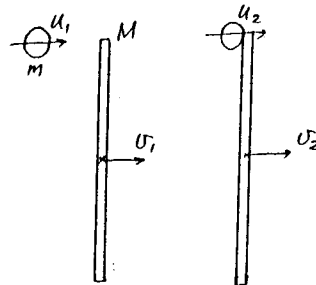


Fig. II.

4. A simple pendulum of mass m_2 with a mass m_1 at the support which can move freely on a horizontal line lying in the plane in which m_2 moves as shown in Fig. III.
 - (a) Write down the Lagrangian and the equations of motion for x and ϕ .
 - (b) Find the period of small oscillation of the system.

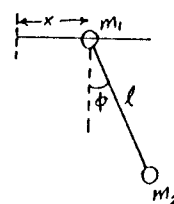


Fig. III.