~~理卷~~

82 機械所

國立成功大學 學年度 考試(動力學 試題) 共 2 頁 第 1 頁

1.(a) From experimental data, the motion of a particle can be represented by the graph shown in Fig. 1. Describe a way
10% to construct the velocity-time graph for the motion.

(b) At the instant $\theta = 90^\circ$ the collar C has an instantaneous speed $V_C = 4$ ft/s and a deceleration $a_C = 3$ ft/s^2 as shown in
20% Fig. 2. Determine the angular acceleration of the link BC.

2. The 50-lb wheel shown in Fig. 3 has a radius of gyration $K_G = 0.7$ ft. Determine the maximum couple moment can be
20% applied to the wheel so that the wheel rolls without slipping. The coefficients of static and kinetic friction between the wheel and the plane are $\mu_s = 0.3$ and $\mu_K = 0.25$, respectively.

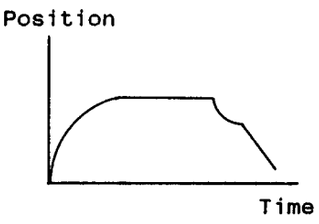

Fig. 1

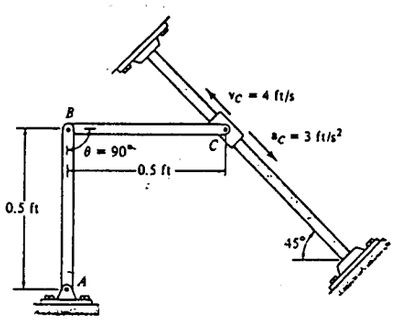

Fig. 2

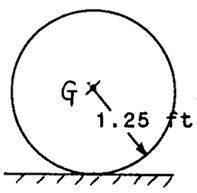

Fig. 3

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3. For a two dimensional problem,
   (a) shows that the kinetic energy of a rigid body is

$$T = 1/2\, mV_G^2 + 1/2\, I_G\omega^2 \quad (18\%)$$

   where V_G is the velocity of the mass center, I_G is the mass moment of inertia related to the mass center and ω is the angular velocity of the rigid body.
   (b) when a rigid body is rotating about a fixed axis passing through point O, shows that the kinetic energy of the rigid body is

$$T = 1/2\, I_o\omega^2 \quad (7\%)$$

   where I_o is the mass moment of inertia related to point O.

4. The solid ball of mass m is dropped with a velocity v_1 onto the edge of the rough step. If it rebounds horizontally off the step with a velocity v_2, determine the angle θ at which contact occurs. Assume no slipping occurs when the ball strikes the step. The coefficient of restitution is e. (25%)