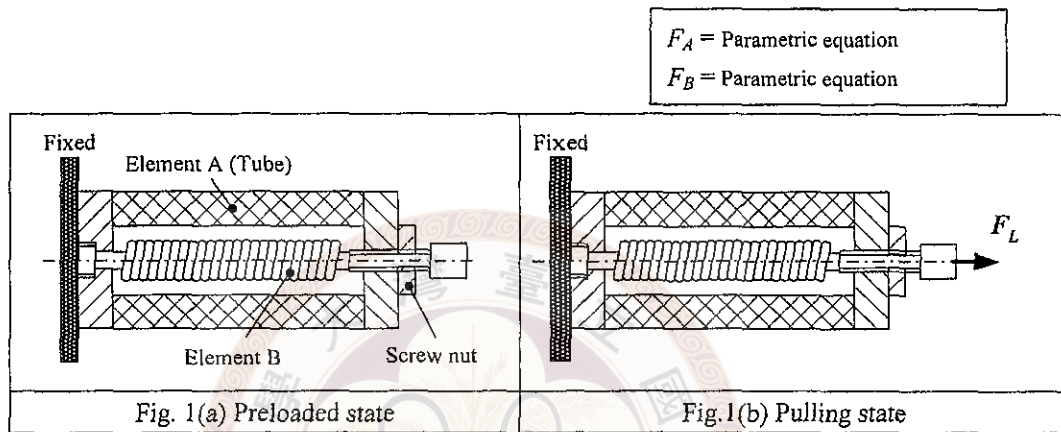


1. (20%) Through turning and tightening the screw nut, the two elements A and B are preloaded by a force of F_p , as shown in the following Fig.1(a). They possess the spring rates of C_A and C_B respectively. Under the preloaded state, the rod is pulled by a force of F_L , as shown in the following Fig.1(b). Determine the forces F_A and F_B of the two elements A and B in the Fig. 1(b).



2. (20%) Fig. 2 shows a loaded wheelbarrow. The total weight of the sand loaded wheelbarrow is 200 kg. The 300mm-diameter wheel rotates over a 20 mm-diameter axle. The coefficient of the rolling resistance R_r for the wheel on pavement is 1.3 mm, and the coefficient of kinetic friction μ_k between the wheel and the axel is 0.2. Determine the needed forces F_X and F_Y for pushing the loaded wheelbarrow at a constant speed.

$F_X = \text{Parametric equation}$
 $F_Y = \text{Parametric equation}$

$F_X = \text{Calculated value in "N"}$
 $F_Y = \text{Calculated value in "N"}$

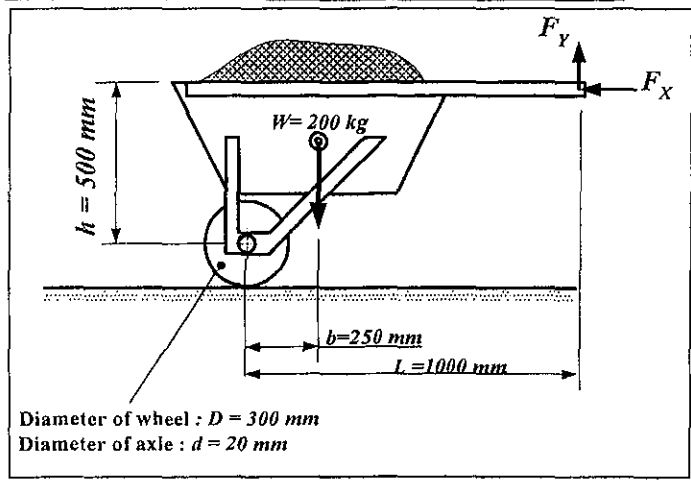
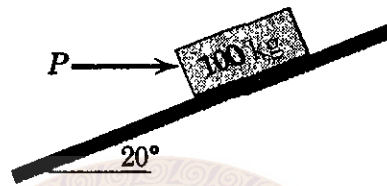


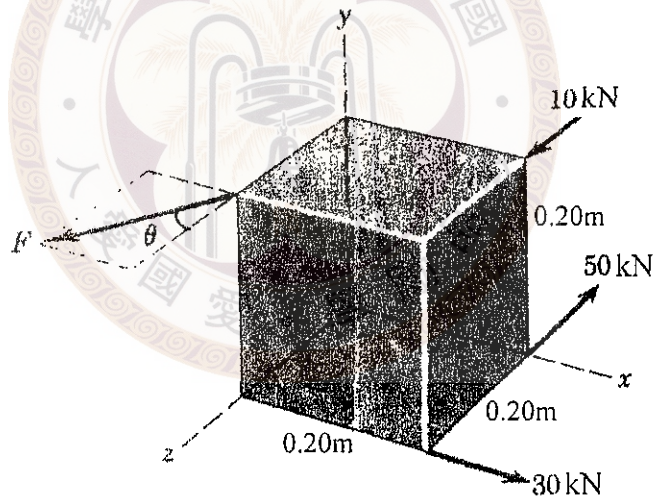
Fig. 2 Loaded wheelbarrow

見背面

3. (20%) 重 100kg 的長方塊置於傾斜 20 度的板子上，現在以一水平力 P 去推它，如下圖所示。假設長方塊與板子之間的靜摩擦係數為 0.20、而動摩擦係數為 0.17。起初，長方塊是完全靜止的。(a)假設 P 為 500N，(b)假設 P 為 100N，在這兩種情況下，分別算出板子對長方塊所施之摩擦力的大小、與方向(向上或向下)？



4. (20%) 下圖中，作用於正六面體上的四個力的合力，假如只有一個力矩(couple) M ，請求出向量 M 與圖中的 F 和 θ 。



5. (20%) 說明與簡答題: (各 5 分)
- a. 靜力學(Statics)的研究內容
 - b. Rigid body 的定義
 - c. A Couple 的定義
 - d. Centroid of a rigid body 的定義

試題隨卷繳回