

P774, D-41

Determine

(a)  $\# \rightarrow \Phi$

(b) the maximum shear stress of segments AB and BC.

$$\tau_{\max}^{AB} = \text{--- MPa}, \tau_{\max}^{BC} = \text{--- MPa}$$

(c) the angle of rotation for segments AB and BC.

$$\phi_{AB} = \text{--- rad}, \phi_{BC} = \text{--- degree}$$

(d) the rotation angle of A with respect to support at C.  $\phi_{AC} = \text{--- rad} = 0.362 \text{ degree}$

$\Rightarrow C$  不動, 看 A 面轉子角度

$$\phi_{AC} = \phi_{AC} = \phi_{AB} - \phi_{BC} = 0.362^\circ$$

複合

軸

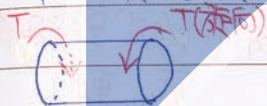
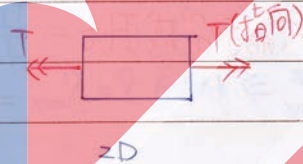
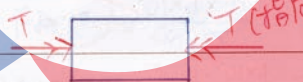
傳遞

扭矩

The compound shaft is used to transmit the torques shown. Steel ( $G = 75 \text{ GPa}$ ) segment AB is a solid 100mm diameter shaft. Brass ( $G = 37 \text{ GPa}$ ) segment BC is a tube with an outside diameter of  $D = 200 \text{ mm}$  and a wall thickness of  $t = 50 \text{ mm}$ .

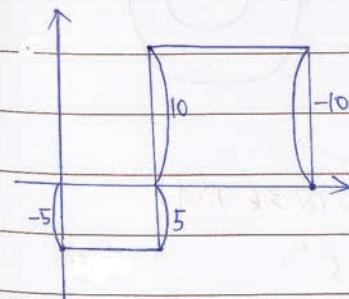
&lt;sol&gt;

軸向負荷類比法

類比成  
軸向負荷指向外之T  
想像成"拉力"

想像成"壓力"

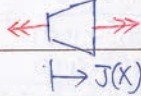
由2D之自由體圖:



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若  $T$  不為常數: 則  $\phi$  不能用  $\phi = \frac{TJ}{G}$  計算 (變數)

① 剖面法 (分段做) ② 積分法 ( $T, J$  連續變數)



$$\phi = \int \frac{T}{GJ} dx$$