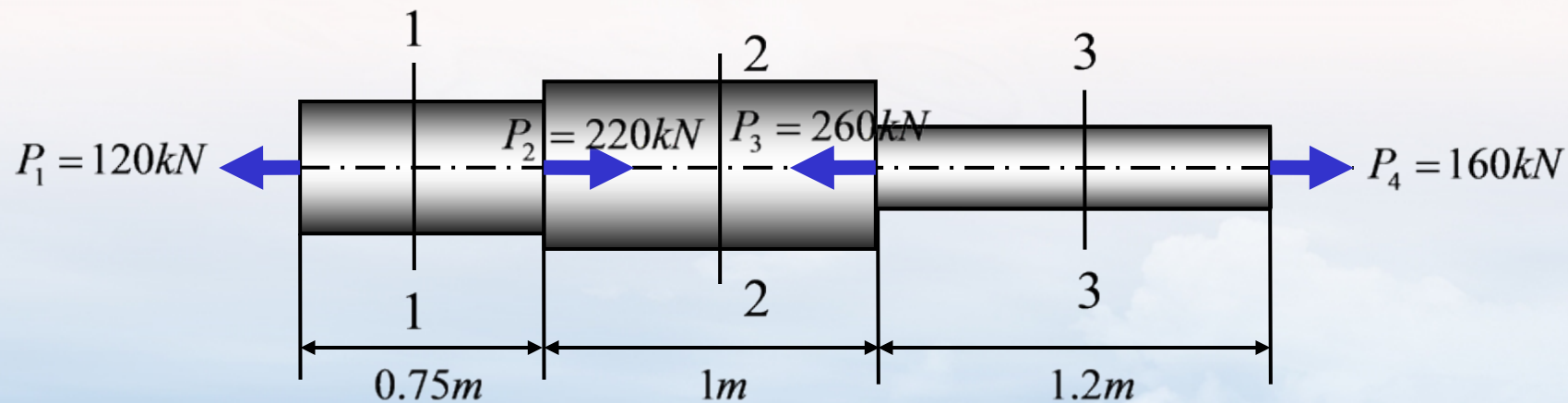


# 例题一



# 轴向拉压杆的变形

一钢制阶梯杆如图所示。各段杆的横截面积分别为 $A_1=1600\text{mm}^2$ ， $A_2=2000\text{mm}^2$ ， $A_3=900\text{mm}^2$ 。弹性模量 $E=200\text{GPa}$ 。试求杆的总长度改变。



解：（1）求轴力

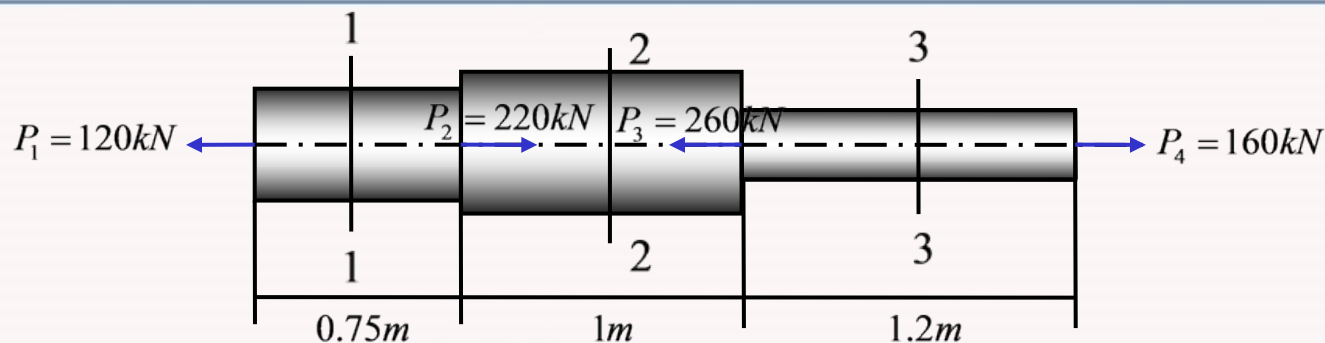
$$N_1 = 120\text{kN}$$

$$N_2 = 120 - 220\text{kN} = -100\text{kN}$$

$$N_3 = 160\text{kN}$$



# 轴向拉压杆的变形



$$N_1 = 120kN$$

$$N_2 = 120 - 220kN = -100kN$$

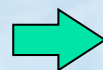
$$N_3 = 160kN$$

## (2) 求杆的总长度改变

$$\Delta L_1 = \frac{N_1 L_1}{EA_1} = \frac{120 \times 10^3 \times 750}{200 \times 10^3 \times 1600} = 0.28mm$$

$$\Delta L_2 = \frac{N_2 L_2}{EA_2} = \frac{-100 \times 10^3 \times 1000}{200 \times 10^3 \times 2000} = -0.25mm$$

$$\Delta L_3 = \frac{N_3 L_3}{EA_3} = \frac{160 \times 10^3 \times 1200}{200 \times 10^3 \times 900} = 1.07mm$$



$$\begin{aligned}\Delta L &= \Delta L_1 + \Delta L_2 + \Delta L_3 \\ &= 0.28mm - 0.25mm + 1.07mm \\ &= 1.10mm\end{aligned}$$

