第 1 回課題解答

$$\sin\theta_B = \frac{4.2}{\sqrt{4.2^2+5.6^2}} = 0.6$$

$$\cos\theta_B = \frac{5.6}{\sqrt{4.2^2+5.6^2}} = 0.8$$

$$\sin\theta_C = \frac{\sqrt{4.2^2+2.4^2}}{\sqrt{4.2^2+2.4^2+5.6^2}} = 0.654$$

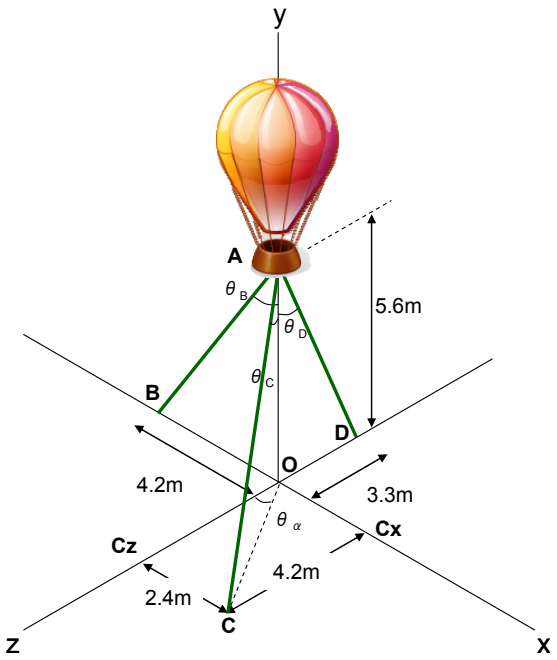
$$\cos\theta_C = \frac{5.6}{\sqrt{4.2^2+2.4^2+5.6^2}} = 0.757$$

$$\sin\theta_D = \frac{3.3}{\sqrt{5.6^2+3.3^2}} = 0.508$$

$$\cos\theta_D = \frac{5.6}{\sqrt{5.6^2+3.3^2}} = 0.862$$

$$\sin\theta_\alpha = \frac{2.4}{\sqrt{4.2^2+2.4^2}} = 0.496$$

$$\cos\theta_\alpha = \frac{4.2}{\sqrt{4.2^2+2.4^2}} = 0.868$$



ケーブルの張力をそれぞれ T_{AB},T_{AC},T_{AD} とする.

x 方向のつりあい条件から,

$$T_{AB}\sin\theta_B = T_{AC}\sin\theta_C\sin\theta_\alpha \qquad (1)$$

z 方向のつりあい条件から,

$$T_{AD}\sin\theta_D = T_{AC}\sin\theta_C\cos\theta_\alpha \qquad (2)$$

2. 99

T_{AB}=259(N)

式(1)より

$$T_{AC} = T_{AB}\frac{\sin\theta_B}{\sin\theta_C\sin\theta_\alpha} = 259*\frac{0.6}{0.654*0.496} = 479.1(N)$$

$$T_{AD} = T_{AC}\frac{\sin\theta_C\cos\theta_\alpha}{\sin\theta_D} = T_{AB}\frac{\sin\theta_B}{\sin\theta_C\sin\theta_\alpha}*\frac{\sin\theta_C\cos\theta_\alpha}{\sin\theta_D} = T_{AB}\frac{\sin\theta_B\cos\theta_\alpha}{\sin\theta_\alpha\sin\theta_D}$$

$$= 259*\frac{0.6*0.868}{0.496*0.508} = 535.3(N)$$

バルーンによる鉛直荷重 V は,

$$V = T_{AB}\cos\theta_B + T_{AC}\cos\theta_C + T_{AD}\cos\theta_D$$

$$= 259*0.8 + 479.1*0.757 + 535.3*0.862 = \underline{1031(N)}$$

2.100

T_{AC}=444(N)

$$T_{AC} = T_{AB}\frac{\sin\theta_B}{\sin\theta_C \sin\theta_\alpha}$$

$$T_{AB} = T_{AC}\frac{\sin\theta_C \sin\theta_\alpha}{\sin\theta_B} = 444 * \frac{0.654 * 0.496}{0.6} = 240.0(N)$$

$$T_{AD} = T_{AC}\frac{\sin\theta_C \cos\theta_\alpha}{\sin\theta_D} = 444 * \frac{0.654 * 0.868}{0.508} = 496.2(N)$$

バルーンによる鉛直荷重 V は,

$$V = T_{AB}\cos\theta_B + T_{AC}\cos\theta_C + T_{AD}\cos\theta_D$$
$$= 240 * 0.8 + 444 * 0.757 + 496.2 * 0.862 = \underline{956(N)}$$

2.101

T_{AD}=481(N)

$$T_{AD} = T_{AC}\frac{\sin\theta_C \cos\theta_\alpha}{\sin\theta_D}$$

$$T_{AC} = T_{AD}\frac{\sin\theta_D}{\sin\theta_C \cos\theta_\alpha} = 481 * \frac{0.508}{0.654 * 0.868} = 430.4(N)$$

$$T_{AC} = T_{AB}\frac{\sin\theta_B}{\sin\theta_C \sin\theta_\alpha}$$

$$T_{AB} = T_{AC} * \frac{\sin\theta_C \sin\theta_\alpha}{\sin\theta_B} = 430.4 * \frac{0.654 * 0.496}{0.6} = 232.7(N)$$

$$V = T_{AB}\cos\theta_B + T_{AC}\cos\theta_C + T_{AD}\cos\theta_D$$
$$= 232.7 * 0.8 + 430.4 * 0.757 + 481 * 0.862 = \underline{927(N)}$$

2.102

V=800(N)

$$T_{AC} = T_{AB}\frac{\sin\theta_B}{\sin\theta_C \sin\theta_\alpha}$$

$$T_{AD} = T_{AB}\frac{\sin\theta_B \cos\theta_\alpha}{\sin\theta_\alpha \sin\theta_D}$$

$$V = T_{AB}\cos\theta_B + T_{AC}\cos\theta_C + T_{AD}\cos\theta_D$$

$$800 = T_{AB}\cos\theta_B + T_{AB}\frac{\sin\theta_B}{\sin\theta_C \sin\theta_\alpha}\cos\theta_C + T_{AB}\frac{\sin\theta_B \cos\theta_\alpha}{\sin\theta_\alpha \sin\theta_D}\cos\theta_D$$

$$800 = T_{AB}\left(\cos\theta_B + \frac{\sin\theta_B}{\sin\theta_C \sin\theta_\alpha}\cos\theta_C + \frac{\sin\theta_B \cos\theta_\alpha}{\sin\theta_\alpha \sin\theta_D}\cos\theta_D \right)$$

$$T_{AB} = \underline{201(N)}$$

$$T_{AC} = \underline{372(N)}$$

$$T_{AD} = \underline{415(N)}$$