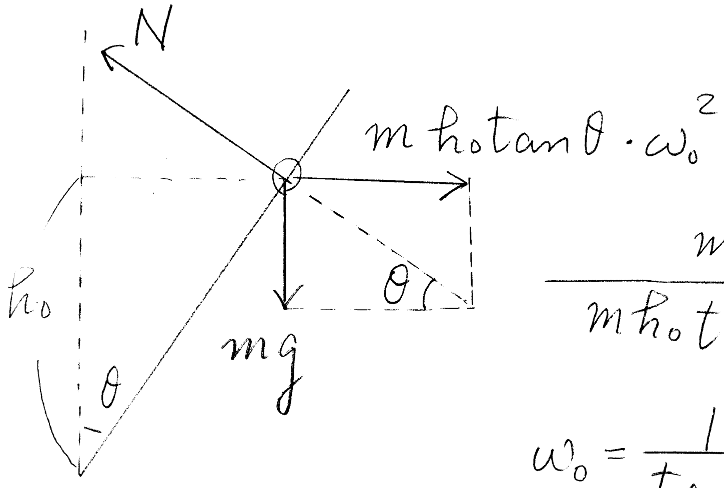
26

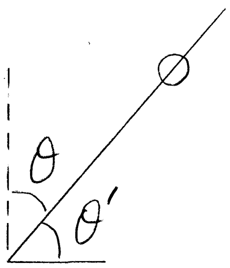
(1)



$$\frac{mg}{mh_0\tan\theta\cdot\omega_0^2}=\tan\theta$$

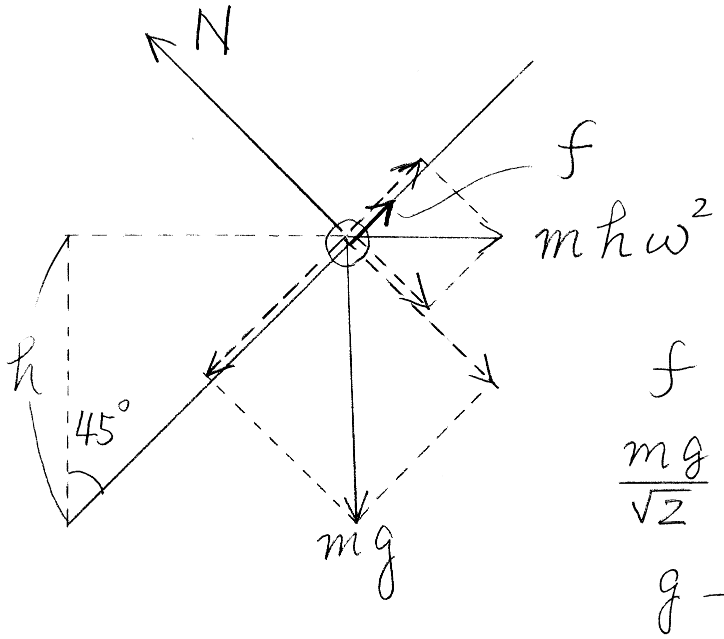
$$\omega_0=\frac{1}{\tan\theta}\sqrt{\frac{g}{h_0}}$$ ――(ア)

(2) 遠心力がなければ，摩擦角の知識から，



$$\mu \geqq \tan\theta' = \frac{1}{\tan\theta}$$

$$\tan\theta \geqq \frac{1}{\mu}$$ ――(イ)



$$f+\frac{mh\omega^2}{\sqrt{2}}=\frac{mg}{\sqrt{2}} \quad \cdots ①$$

$$N=\frac{mg}{\sqrt{2}}+\frac{mh\omega^2}{\sqrt{2}} \quad \cdots ②$$

$f \leqq \mu N$ なので，

$$\frac{mg}{\sqrt{2}}-\frac{mh\omega^2}{\sqrt{2}} \leqq \mu\left(\frac{mg}{\sqrt{2}}+\frac{mh\omega^2}{\sqrt{2}}\right)$$

$$g-h\omega^2 \leqq \mu(g+h\omega^2)$$

$$g(1-\mu) \leqq (1+\mu)h\omega^2$$

$$\omega \geqq \sqrt{\frac{(1-\mu)g}{(1+\mu)h}}$$ ――(ウ)

(26-2)

fの向きを逆にするだけなので，図は省略．

$$f+\frac{mg}{\sqrt{2}}=\frac{mr\omega^2}{\sqrt{2}} \quad \cdots\cdots ③$$

$$N=\frac{mg}{\sqrt{2}}+\frac{mr\omega^2}{\sqrt{2}} \quad \cdots\cdots ④$$

$f \leqq \mu N$ なので，

$$\frac{mr\omega^2}{\sqrt{2}}-\frac{mg}{\sqrt{2}} \leqq \mu\left(\frac{mg}{\sqrt{2}}+\frac{mr\omega^2}{\sqrt{2}}\right)$$

$$(1-\mu)r\omega^2 \leqq (1+\mu)g$$

$$\underline{\omega \leqq \sqrt{\frac{(1+\mu)g}{(1-\mu)r}}} \quad (エ)$$