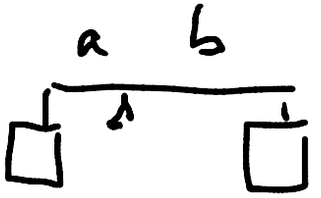
Sprechstunde

Mo 10 - 12

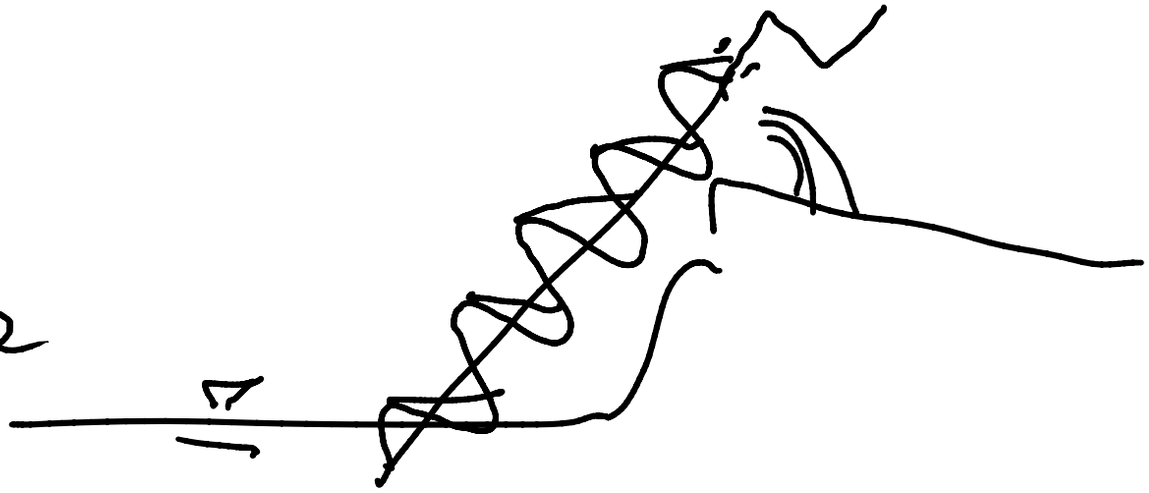
Archimedes *287 †212 BC

1 Hebelgesetz



2 Auftriebsgesetz

3 Schraubenpumpe



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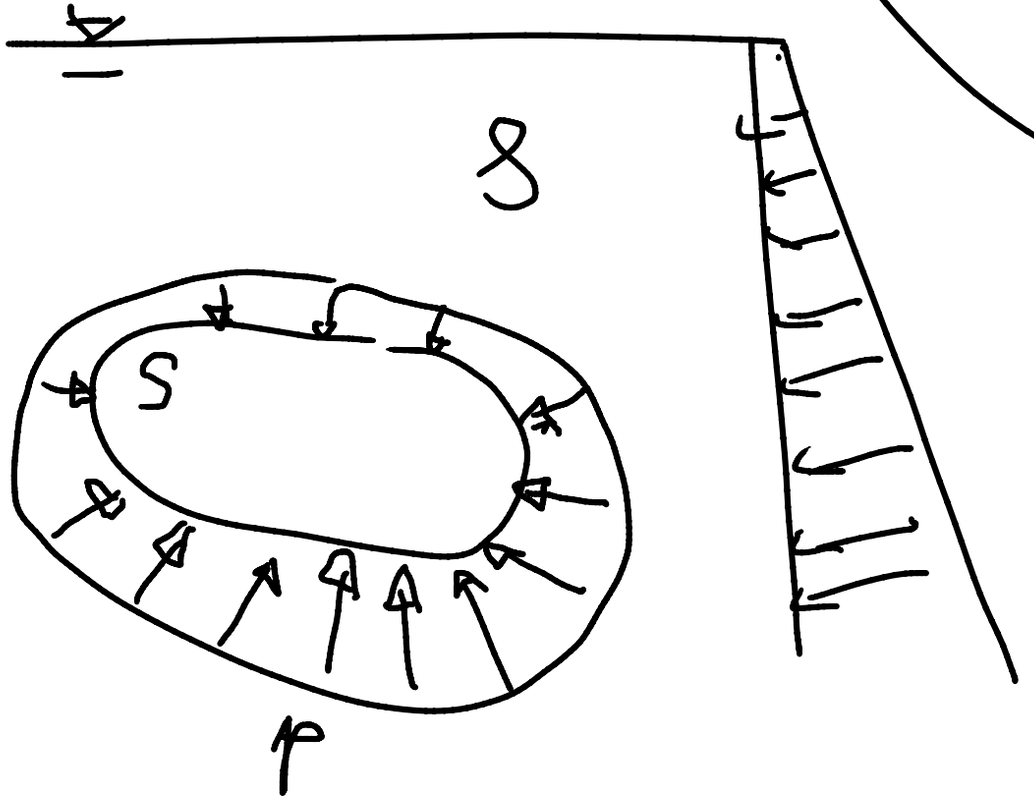
$$\nabla p = -\rho g \vec{e}_z$$

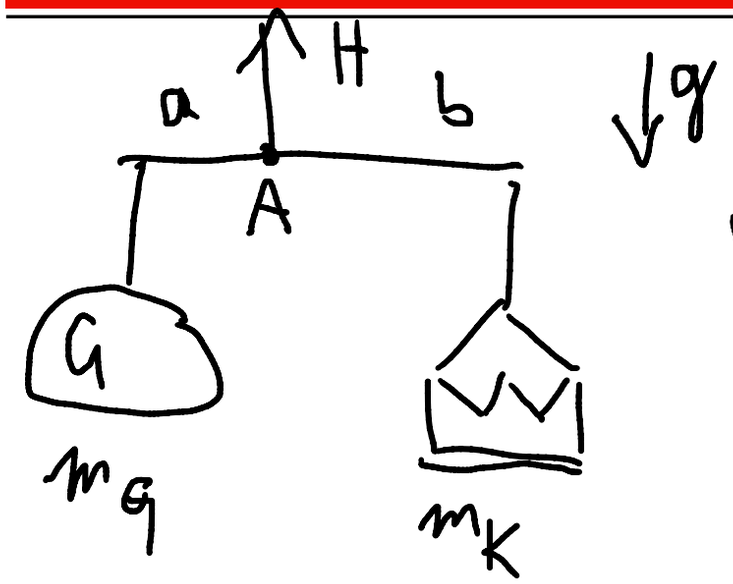
$\vec{e}_z$ ↑ g ↓



$$F_p = \oint_S -p\vec{n}\, dS =$$

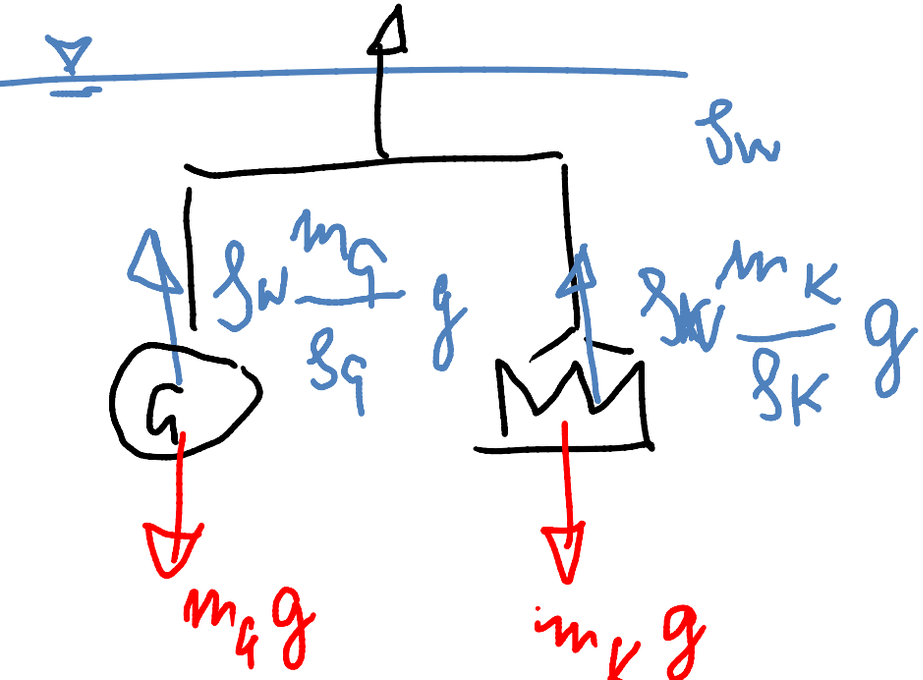
$$= \iiint_V -\nabla p\, dV \quad (\text{Gauß})$$

$$= \iiint_V \rho g \vec{e}_z\, dV = \rho g V \vec{e}_z$$



$$\curvearrowleft A: \quad m_G g a - m_K g b = 0$$

$$m_G a = m_K b \quad (I)$$



$$\curvearrowleft A: \quad m_G g a\left(1 - \frac{\rho_W}{\rho_G}\right) - m_K g b \left(1 - \frac{\rho_W}{\rho_K}\right) = 0$$

$$m_G a \left(1 - \frac{\rho_W}{\rho_G}\right) = m_K b \left(1 - \frac{\rho_W}{\rho_K}\right) \quad (II)$$

$$1 - \frac{\rho_W}{\rho_G} = 1 - \frac{\rho_W}{\rho_K}$$

$$\rho_G \overset{!}{=} \rho_K$$

TECHNISCHE UNIVERSITÄT DARMSTADT

FLUID SYSTEM TECHNIK

Einführung in die Hydrodynamik

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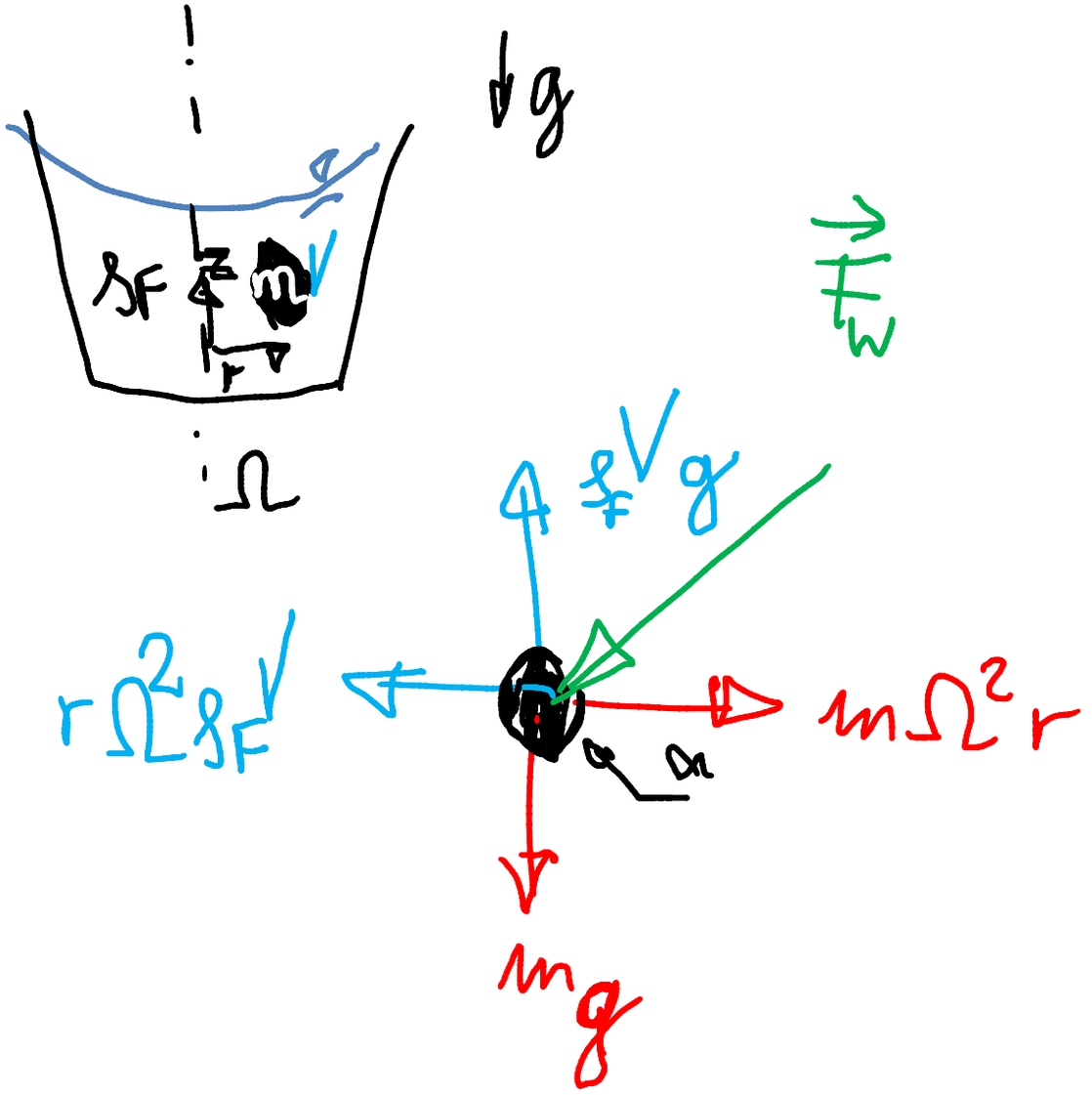

$$F_W = \eta\, 6\pi a\, \vec{u} \qquad (Re \ll 1)$$

$$F_W = \frac{\rho}{2} c_w \vec{u} |\vec{u}|$$

$$Re = \frac{v a \rho}{\mu} = \frac{u a}{\nu}$$

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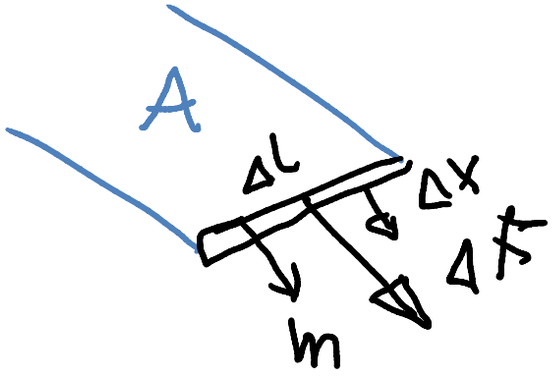
$$r: \quad 0 = (m - \rho_F V)\,\Omega^2 r - F_{wr}$$

$$z: \quad 0 = (\rho_F V - m)\,g - F_{wz}$$



m Normale der Schnittkante

$$\sigma = \frac{\Delta F}{\Delta L}$$

$$W = \int F\,dx = \iint \sigma\,dy\,dx = \iint \sigma\,dA$$

$$E_0 = \sigma A = cA$$

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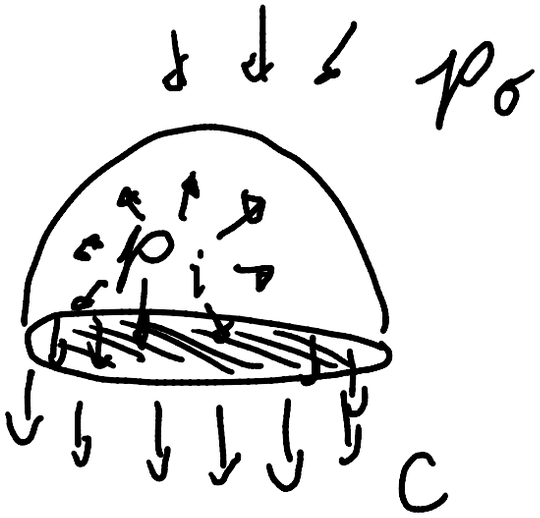
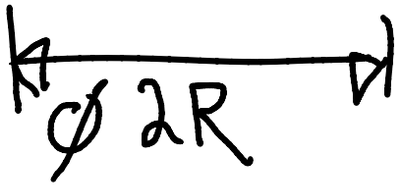
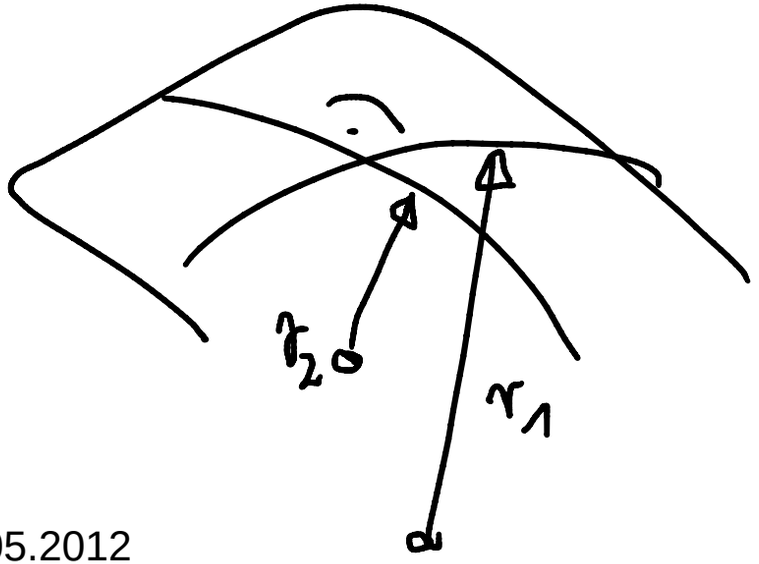


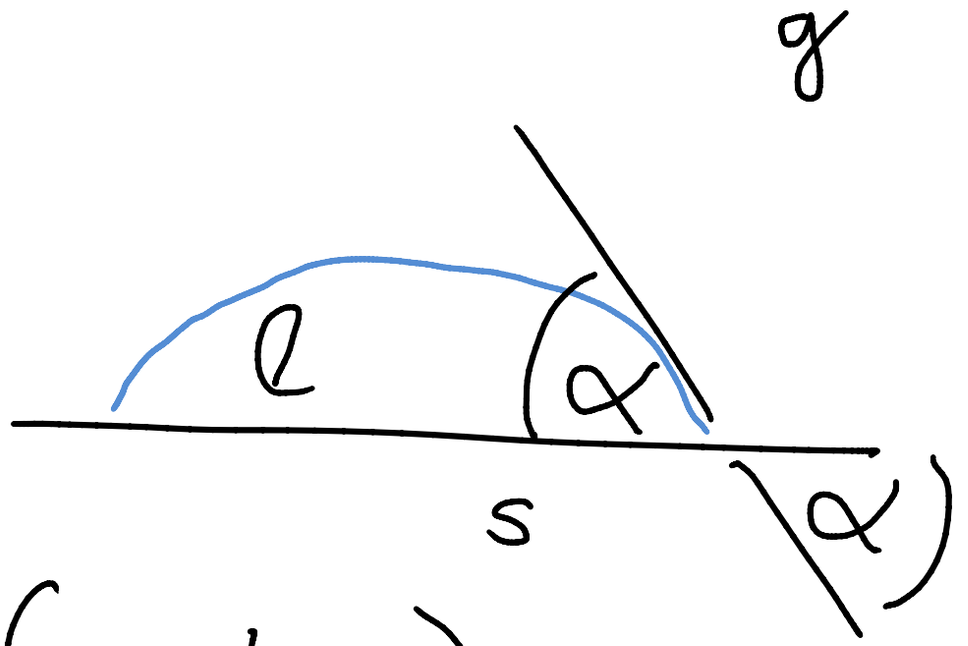


$$\uparrow: (p_i - p_0)\pi R^2 - 2C\pi R = 0$$

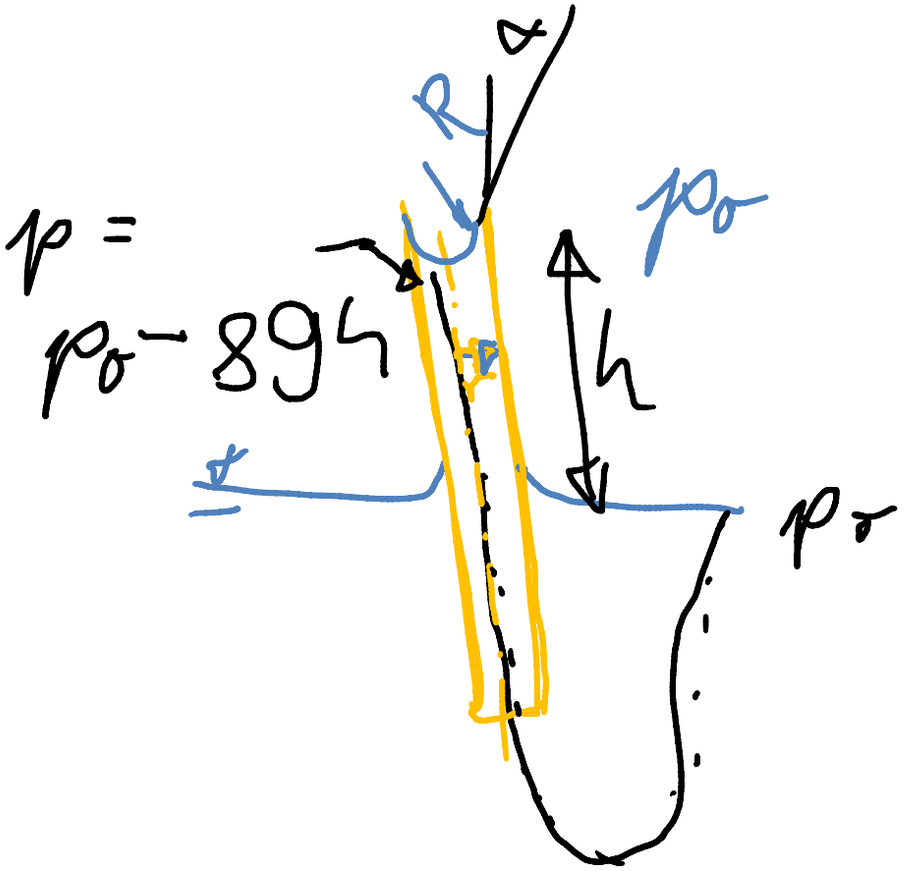
$$p_i - p_0 = \frac{2C}{R}$$

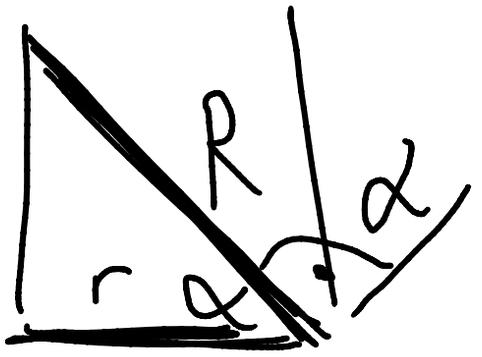


$$p_i - p_0 = \Delta p = C\left(\frac{1}{r_1} + \frac{1}{r_2}\right)$$



$$\alpha = \alpha(s, l, g)$$

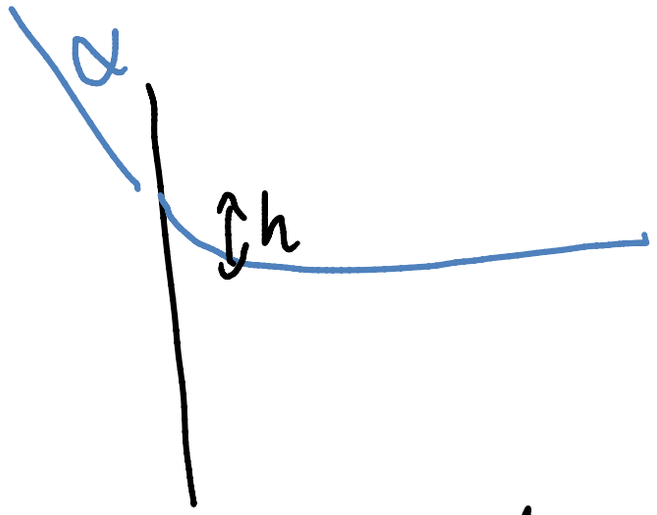




$$R = r / \cos\alpha$$

$$\Delta p = \frac{2C\cos\alpha}{r} = \rho g h$$

$$\boxed{h = \frac{2C\cos\alpha}{\rho r g}}$$



$$h^2 = 2a^2(1-\sin\alpha)$$

$$h = f(a, C, \rho, g)$$

$$\frac{C}{\rho g} = a^2 \qquad a = \sqrt{\frac{C}{\rho g}}$$

$$\boxed{h = a\sqrt{2(1-\sin\alpha)}}$$

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