

Dobrý den!

210.2009

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6. přednáška

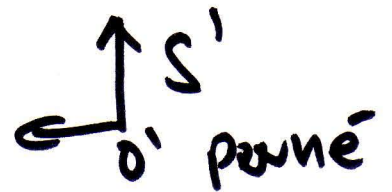
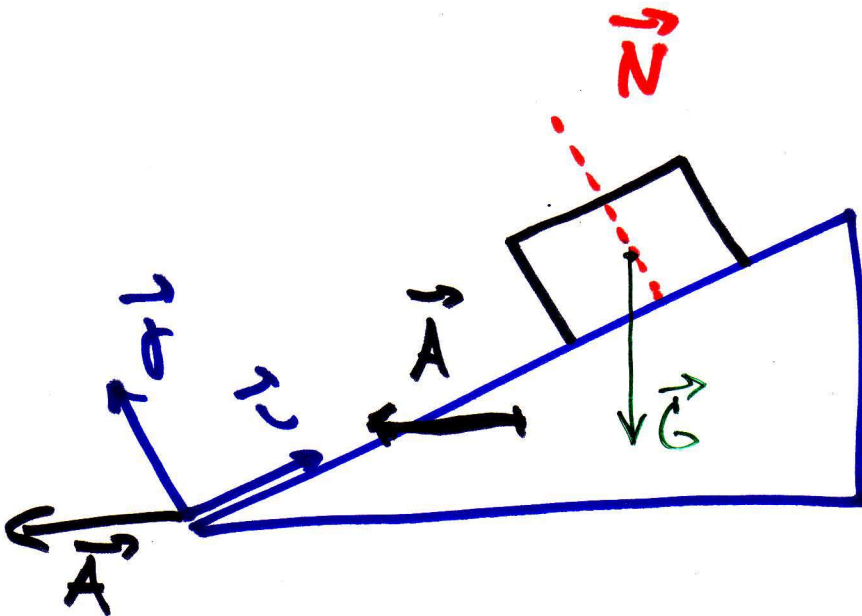
Newtonovy pohybové rovnice
řešení pohybových rovnic

Kontrola DÚ ✓

95% NE

5% ANO

→ 90% TRVÁNÍ
↳ 10% MUDNĚ



$$\vec{F}_{\text{rot}} = m \vec{a}_{\text{rot}} = m \vec{a}_{\text{fix}} - \vec{R} - 2\vec{\omega} \times \vec{v}_{\text{rot}} - \dot{\vec{\omega}} \times \vec{r} - \vec{\omega} \times (\vec{\omega} \times \vec{r})$$

$$\vec{F}_{\text{v}} = m \vec{a}_{\text{fix}}$$

n neinerciální:

$$\vec{F}_{\text{v}} = m \vec{a}_{\text{rot}} (= m \vec{a}^*)$$

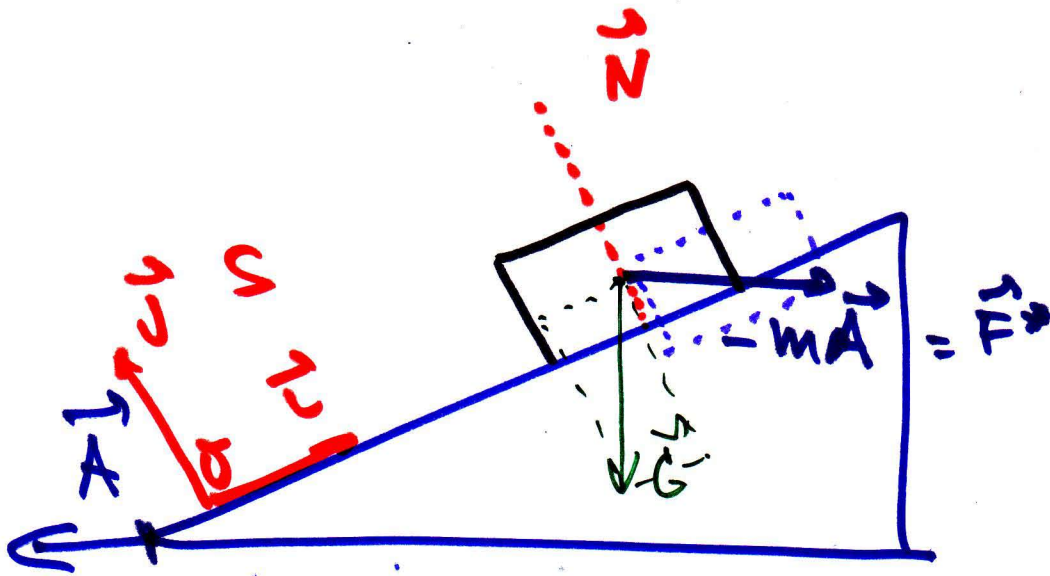
$$\vec{F}_{\text{v}} = \vec{G} + \vec{N}$$

$$\vec{F}_{\text{v}} = \vec{G} + \vec{N} + \vec{F}^*$$

konc: $\vec{F}^* = -m\vec{A}$

u nás: inercie..

neinercie..

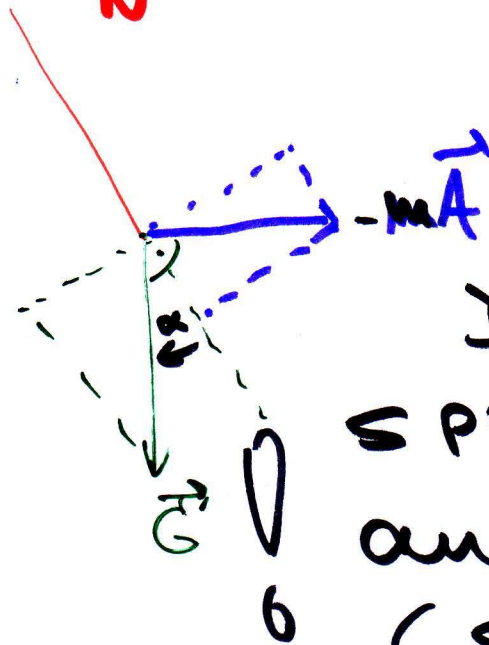


Je daná $\vec{A} = ?$, ať $\vec{v}_r = \vec{0}$
 (velikosti vůči S)

$$\vec{F}_v(s) = \vec{0} = \vec{G} + \vec{N} + \vec{F}_f$$

\vec{N}

re směru \vec{l} :



Je:

S podloženin:

an F_r v tečce
 (S i S') (na kromě)

těleso 1:

$$\vec{F}_1 = \vec{G}_1 + \vec{N}_1 + \vec{F}_1 = m_1 \vec{a}_1$$

$$\vec{G}_1 = (-m_1 g \sin \alpha; -m_1 g \cos \alpha; 0)$$

$$\vec{N}_1 = (0; N; 0)$$

$$\vec{F}_1 = (F_1; 0; 0)$$

$$\vec{a}_1 = (\ddot{x}_1; \ddot{y}_1; \ddot{z}_1)$$

$$m_1 \ddot{x}_1 = F_1 - m_1 g \sin \alpha$$

$$m_1 \ddot{y}_1 = N - m_1 g \cos \alpha$$

$$(m_1 \ddot{z}_1 = 0)$$

těleso 2:

$$\vec{F}_2 = \vec{G}_2 + \vec{F}_2 = m_2 \vec{a}_2$$

$$\vec{G}_2 = (0; -m_2 g; 0)$$

$$\vec{F}_2 = (0; F_2; 0)$$

$$(m_2 \ddot{x}_2 = 0)$$

$$m_2 \ddot{y}_2 = F_2 - m_2 g$$

$$(m_2 \ddot{z}_2 = 0)$$

Rovnice "navic"'

$$x_1 = -y_2$$

$$\ddot{x}_1 = -\ddot{y}_2$$

Nehmotná kládka

$$F_1 = F_2 = F_{\text{tana}}$$

$$\ddot{y}_2 = \frac{m_1 \sin \alpha - m_2}{m_1 + m_2} g$$

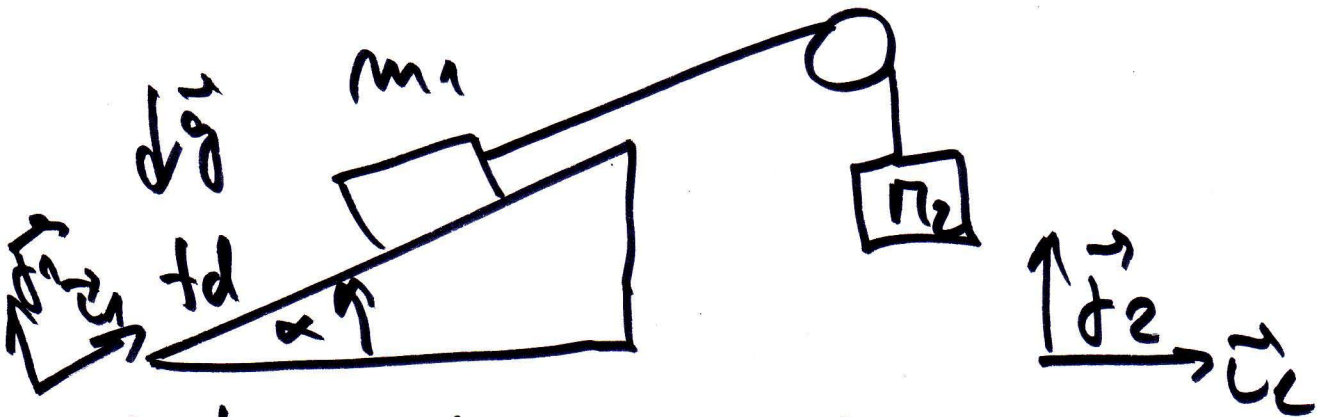
tedy:

$$m_1 (-\ddot{y}_2) = F_L - m_1 g \sin \alpha \quad (-1)$$

$$m_2 \ddot{y}_2 = F_L - m_2 g$$

$$\ddot{y}_2 (m_1 + m_2) = m_1 g \sin \alpha - m_2 g$$

Warunek: miana 100x inne:
8. powa...
A co dalej?



odhad:

$$\ddot{y}_2 = \frac{(fd \cos \alpha + m_1 \sin \alpha) - M_2}{m_1 + M_2} g =$$

$$= \frac{m_1 (fd \cos \alpha + \sin \alpha) - M_2}{m_1 + m_2} g$$

užití NPt:

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Pr.: Dvě kolo:

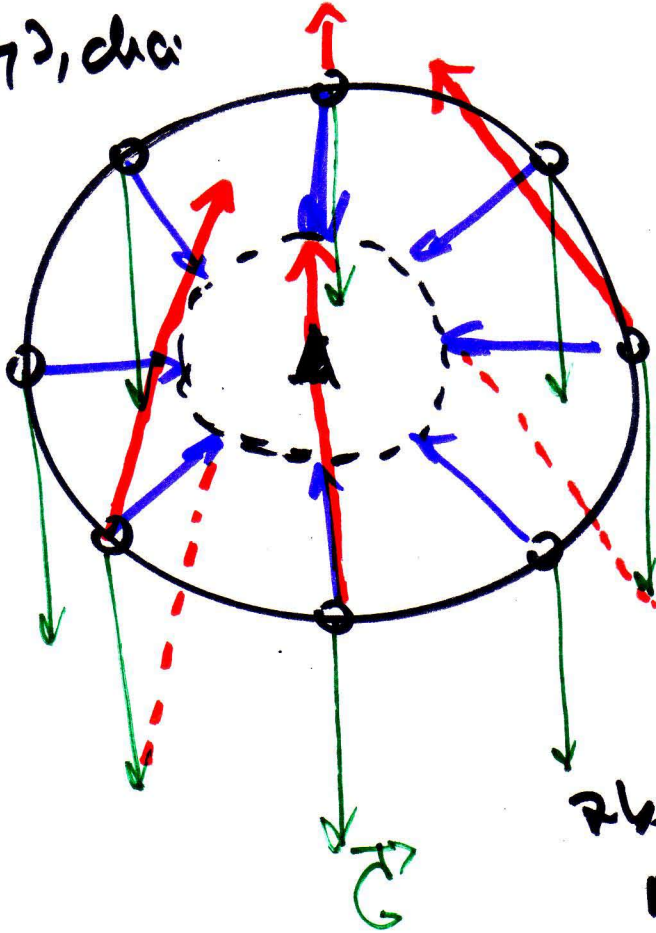
průměr polky, dva
jedním teší

$$\vec{v}_3 = \vec{v}_1 + \vec{v}_2$$

$$\vec{v}_1 + \vec{v}_2 = \vec{v}_3$$

$$\vec{v}_1 + \vec{v}_2 = \vec{v}_3$$

\vec{g}

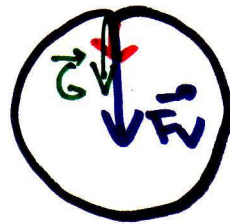


Zvláštnost
Rusí kolo:



$$\vec{a} + \vec{b} = \vec{c}$$

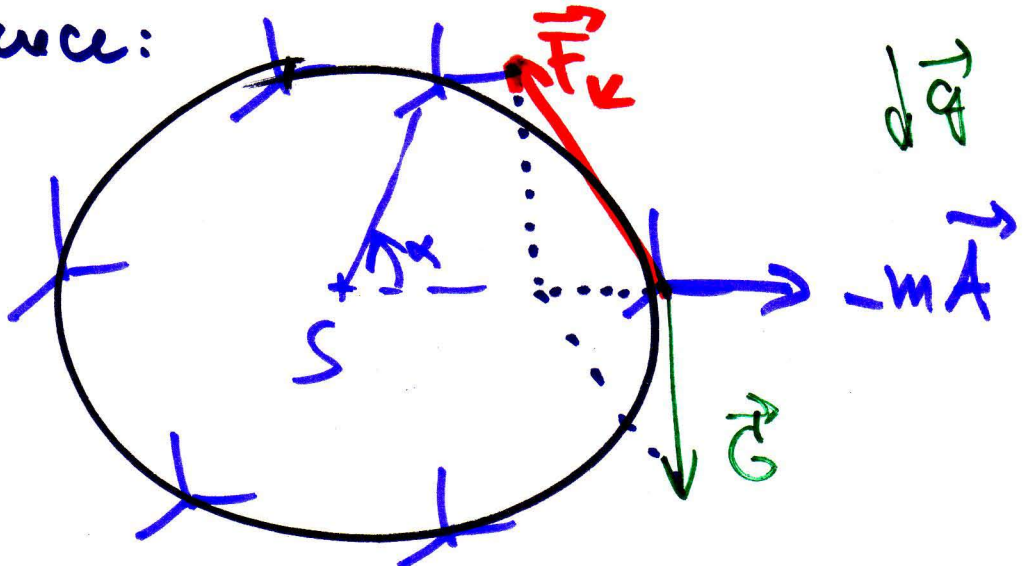
zde je \vec{c} ?



\vec{v} je
velič

mechanice:

S:
 \vec{a}_n



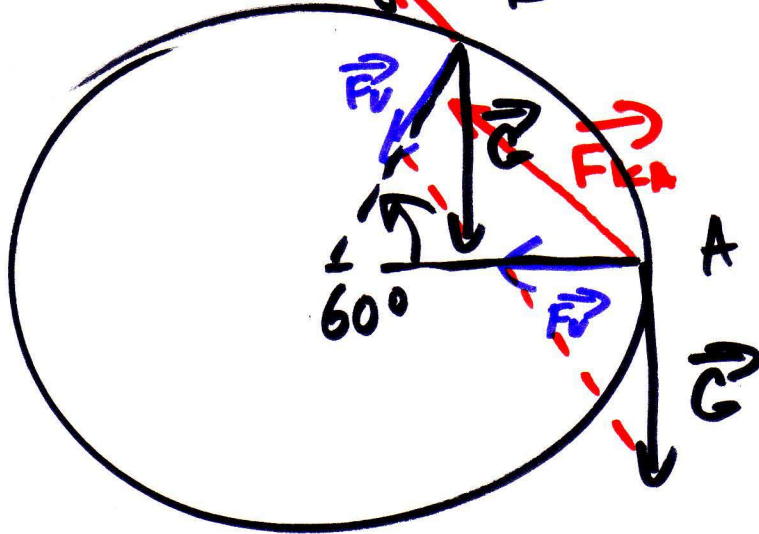
\vec{v}

c)

$R = 10\text{ m}$
 $m = 50\text{ kg}$



$\omega = 0,4\pi \frac{\text{rad}}{\text{s}}$



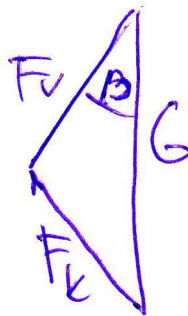
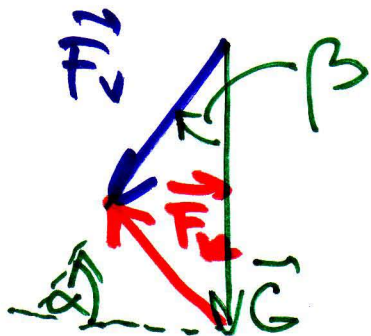
$|\vec{F}_K(60^\circ)| = ?$

$|\vec{G}| = m \cdot g = 500\text{ N}$

$|\vec{F}_V| = m \cdot a_{\text{tang}} = m \cdot \omega^2 \cdot R = 800\text{ N}$

$|\vec{F}_{KA}| = \sqrt{|\vec{F}_V|^2 + |\vec{G}|^2} = \sqrt{800^2 + 500^2} =$

B:



kotinoma vetz: \cos beta, \sin beta,

$c^2 = a^2 + b^2 - 2ab \cos \beta$

... Duh

