

F3 - Kinematika pohybu v rovině

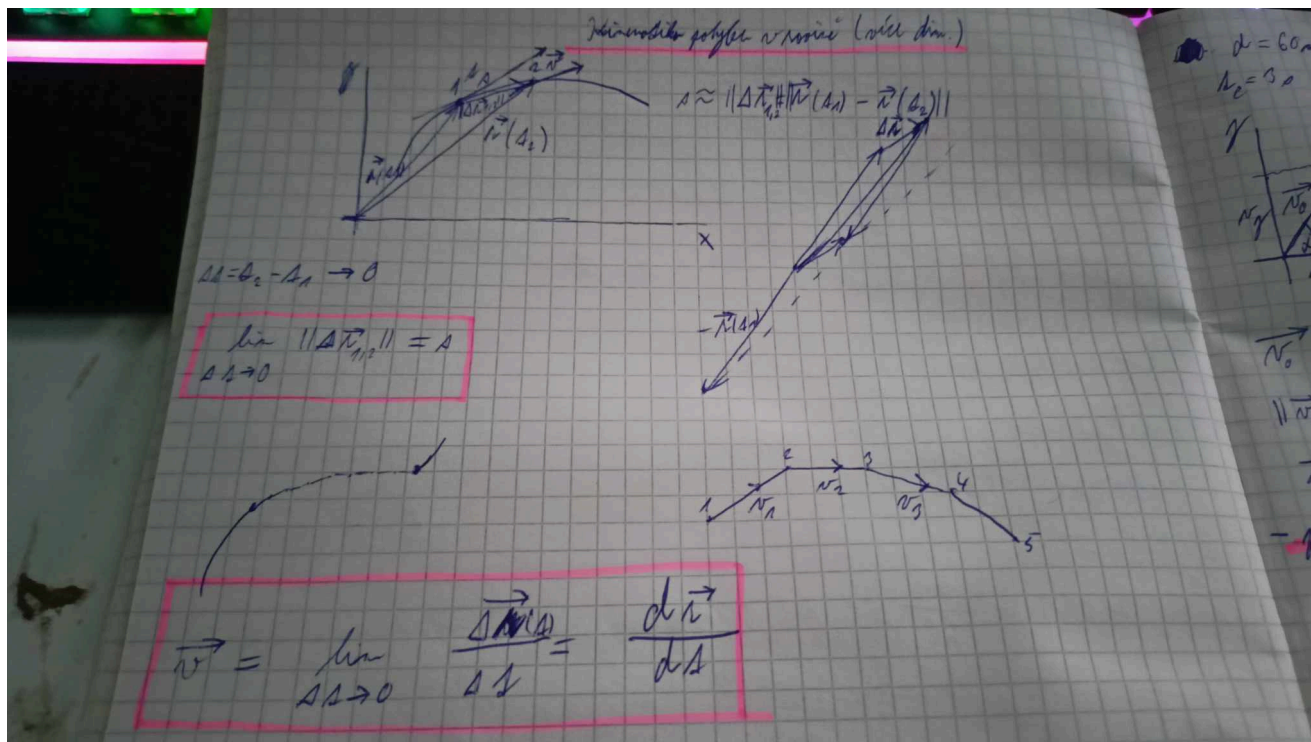
(Více dimenzí)

$$\lim_{\nabla t \rightarrow 0} \|\nabla \vec{r}_{1,2}\| = s$$

$$\vec{v} = \lim_{\nabla t \rightarrow 0} \frac{\nabla \vec{r}_t}{\nabla t} = \frac{d\vec{r}}{dt}$$

Směr rychlosti je vždy tečna k trajektorii

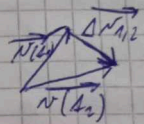
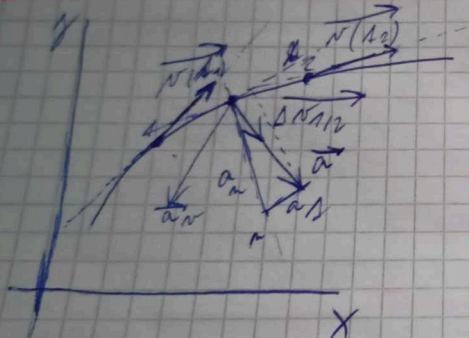
$$\vec{a} = \lim_{\nabla t \rightarrow 0} \frac{\nabla \vec{v}_t}{\nabla t} = \frac{d^2 \vec{v}}{dt^2}$$



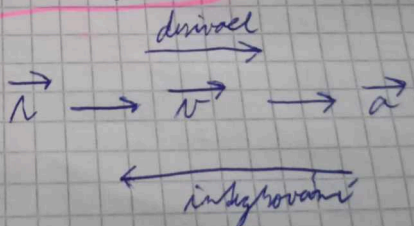
- potyk podk.

- wiczytelnosc wady mianu k. przyspieszenie

$$\vec{a} = \lim_{\Delta t \rightarrow 0} \frac{\Delta \vec{v}(t)}{\Delta t} = \frac{d\vec{v}}{dt} = \frac{d^2 \vec{r}}{dt^2}$$



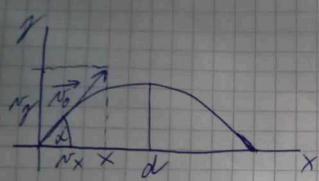
$$\vec{a} = \vec{a}_t + \vec{a}_n$$



$$\vec{a} = \vec{a}_t + \vec{a}_n$$

wekt. (km.)

$d = 60 \text{ m}$
 $h_0 = 3 \text{ m}$



$$\vec{v}_0 = [v_x, v_y]$$

$$\|\vec{v}_0\| = v_0$$

$$\vec{v}_0 = [v_0 \cdot \cos \alpha, v_0 \cdot \sin \alpha]$$

- potyk podk. w x → równanie potyk

$$x = v_x \cdot t = v_0 \cos \alpha \cdot t = v_0 t \cos \alpha$$

- potyk podk. w y → równanie wysokość potyk

$$y = v_y t - \frac{1}{2} g t^2 = v_0 t \sin \alpha - \frac{1}{2} g t^2$$

- gibt radial og \rightarrow normierte Ableitung

$$V = \cancel{N_0 h_c} \cos \alpha - \frac{1}{2} g d^2 = \boxed{N_0 h_c \sin \alpha - \frac{1}{2} g d^2}$$

$$d = N_0 h_c \cos \alpha \Rightarrow N_0 = \frac{d}{h_c \cos \alpha}$$

$$0 = N_0 h_c \sin \alpha - \frac{1}{2} g d^2$$

$$d = N_0 h_c \cos \alpha$$

$$\frac{1}{2} g h_c^2 = N_0 h_c \sin \alpha$$

$$\frac{\frac{1}{2} g h_c^2}{d} = \frac{N_0 h_c \sin \alpha}{N_0 h_c \cos \alpha}$$

$$\tan \alpha = \frac{\frac{1}{2} g h_c^2}{d} = \frac{g h_c^2}{2d} \rightarrow \arctan(\tan \alpha) = \arctan\left(\frac{g h_c^2}{2d}\right)$$

$$\alpha = \arctan\left(\frac{g h_c^2}{2d}\right) = \arctan\left(\frac{10 \cdot 9}{2 \cdot 60}\right) = \arctan\left(\frac{3}{4}\right) = 36^\circ 52'$$

$$N_0 = 2418 \text{ m/s}$$