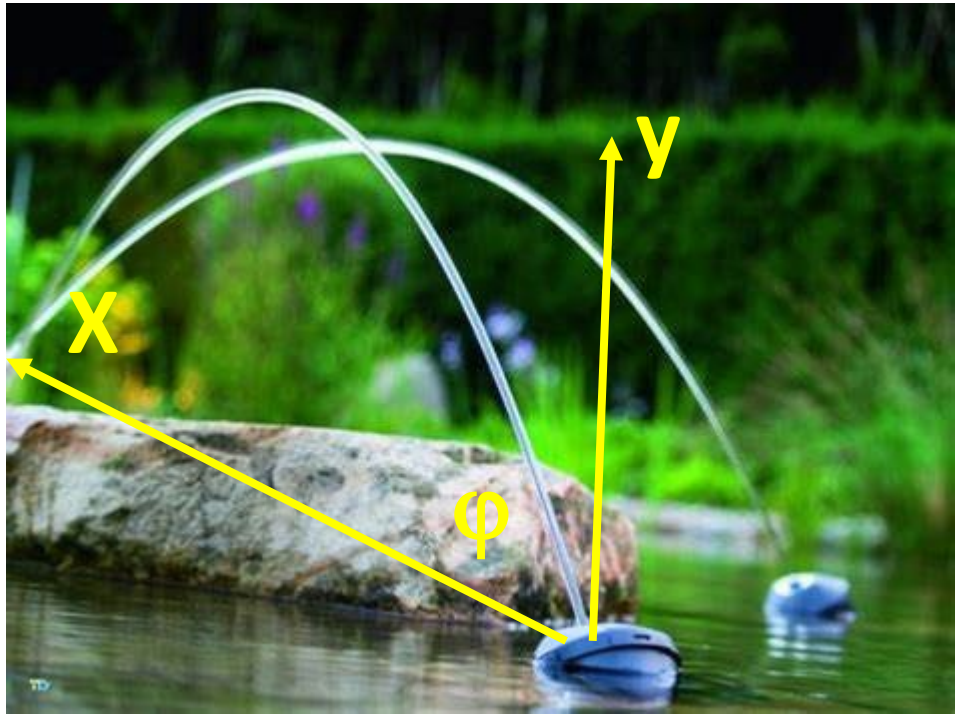
Testiranje hipoteze na preprostem zgledu poševnega meta

Aleš Mohorič
FMF, UL,
Presekov seminar, DMFA, 2021

parabola - curek iz cevi



parabola - curek iz cevi

- $a_x = 0$ $\quad a_y = -g$
- $v_x = v_0 \cos\varphi$ $\quad v_y = v_0 \sin\varphi - gt$
- $x = v_0 \cos\varphi\, t$ $\quad y = v_0 \sin\varphi\ t\ - \frac{1}{2} g t^2$
- $t = \frac{x}{v_0 \cos\varphi}$

- $y = -\frac{g}{2v_0^2 \cos^2\varphi}\ x^2 + \tan\varphi\ x = ax^2 + bx + c$

parabola - curek iz cevi

- $y = -\frac{g}{2v_0^2 \cos^2 \varphi} x^2 + \tan \varphi \ x$
- $d = x(y = 0)$
- $0 = -\frac{g}{2v_0^2 \cos^2 \varphi} d + \tan \varphi$
- $d = \frac{2v_0^2 \cos \varphi \sin \varphi}{g}$
- $h = y\left(x = \frac{d}{2}\right)$
- $h = \frac{v_0^2 \sin^2 \varphi}{2g}$

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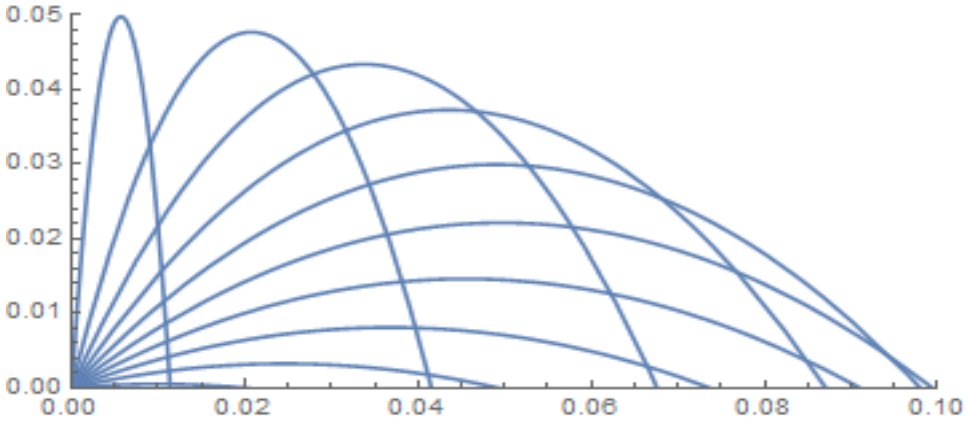
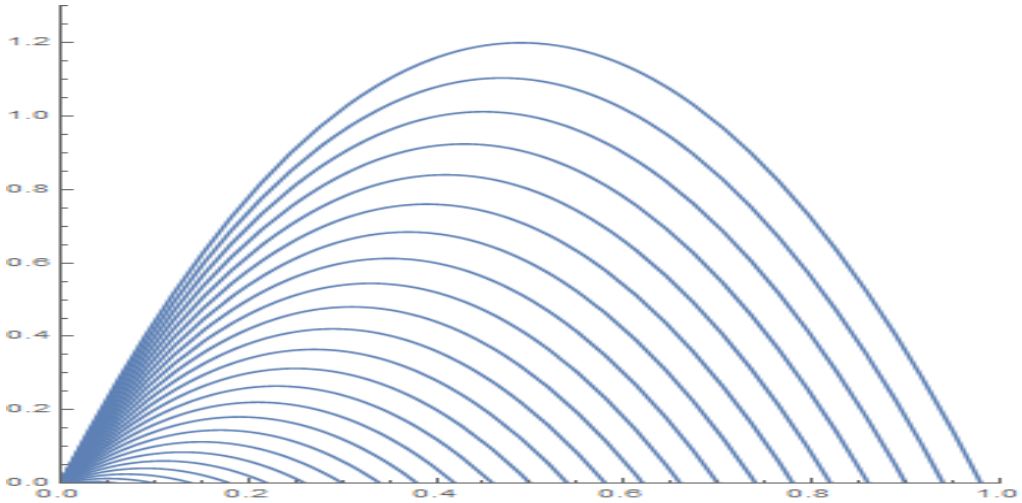
- predpostavke?

- testiranje hipotez?
- teoretična obravnava in primerjava z meritvami

- 1. model
- $x = v_a \cos\varphi \ \ t,$
- $y = v_a \sin\varphi \ \ t - \frac{1}{2} g t^2$
- $y = -\frac{g}{2v_a^2 \cos^2\varphi} \ x^2 + \tan\varphi \ \ x$

- 2. model
- $x = v_a t,$
- $y = v \ t - \frac{1}{2} g t^2,$
- $t = \frac{x}{v_a},$
- $y = v \frac{x}{v_a} - \frac{g x^2}{2v_a^2}$





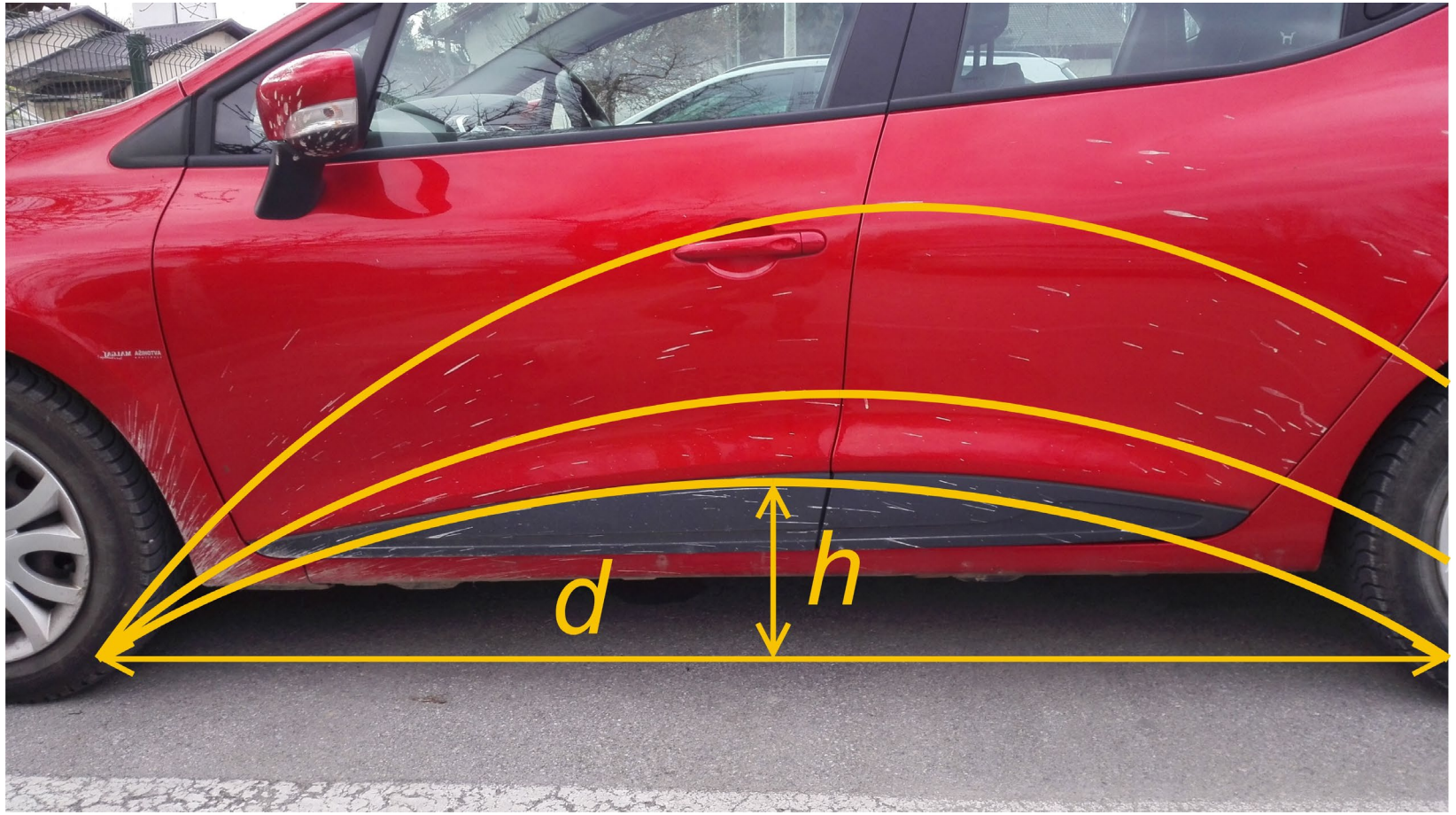
- 1. model
- $x = v_a \cos\varphi \ t,$
- $y = v_a \sin\varphi \ t - \frac{1}{2} g t^2$
- $h = \frac{v_a^2 \sin^2 \varphi}{2g},$
- $d = \frac{2 v_a^2 \cos\varphi \sin\varphi}{g}$

- $d = \sqrt{\frac{8 v_a^2 h}{g} - 16 h^2}$

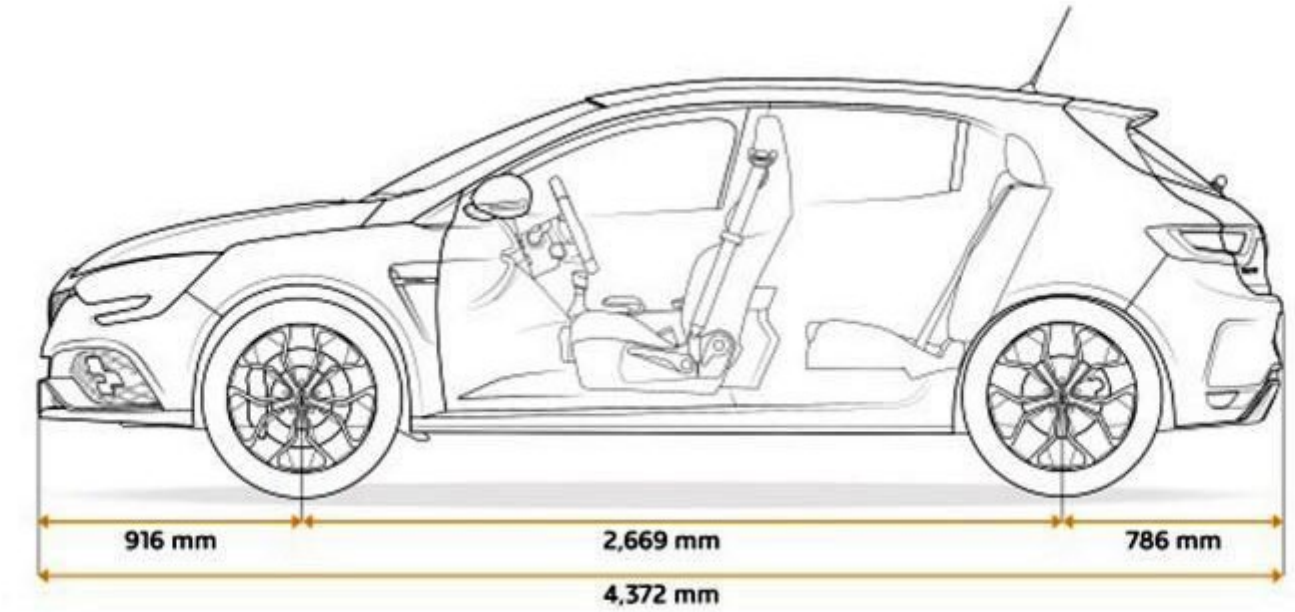
- 2. model
- $x = v_a t,$
- $y = v\, t - \frac{1}{2} g t^2,$
- $v_y = v - gt,\ v_y = 0 = v - g t_{\frac{1}{2}},\ t_{\frac{1}{2}} = \frac{v}{g}$
- $h = y\left(t_{\frac{1}{2}}\right) = v\frac{v}{g} - \frac{1}{2} g \frac{v^2}{g^2} = \frac{v^2}{2g},$
- $d = x\left(2 t_{\frac{1}{2}}\right) = \frac{v_a v}{g}$

- $d = \frac{v_a \sqrt{2h}}{\sqrt{g}}$

Meritve

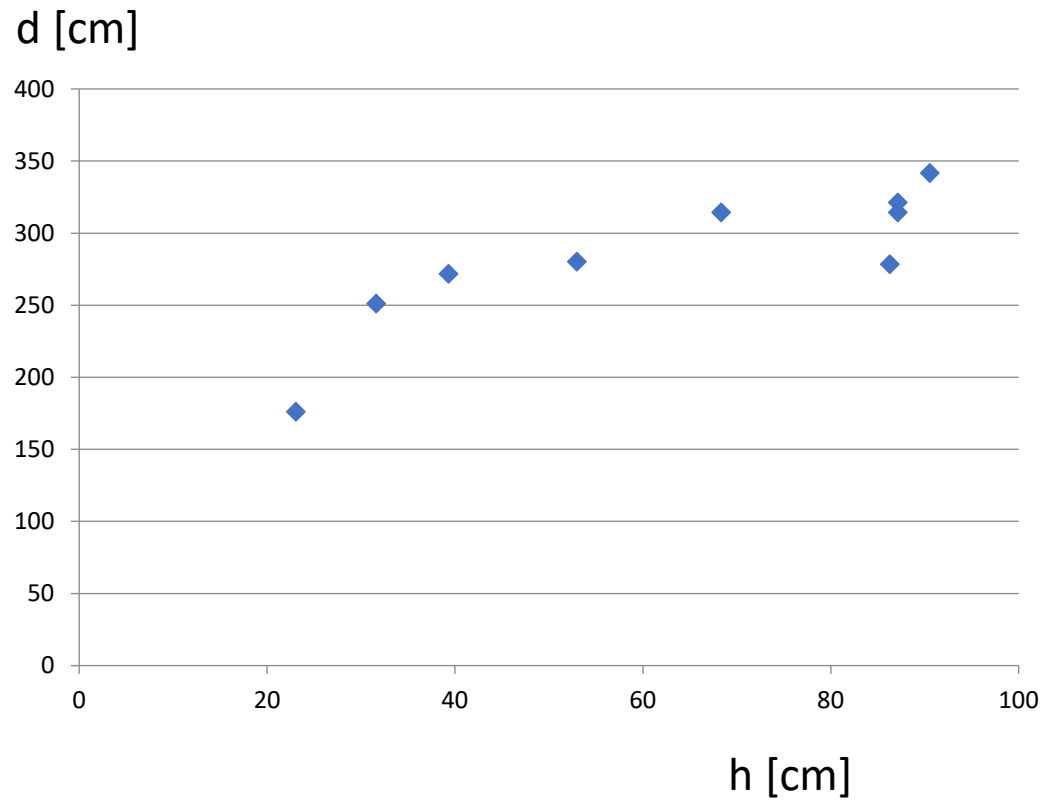


- kako s slike določimo dimenzije?
- razmerja!



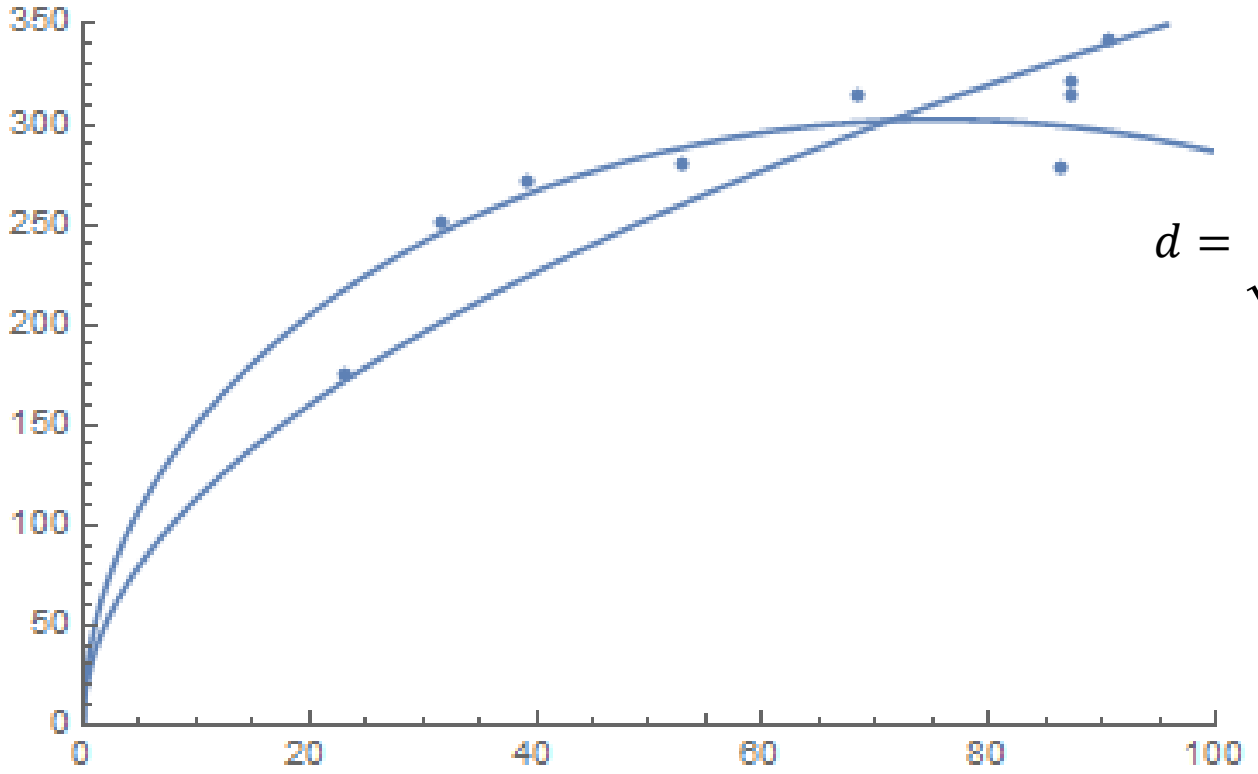
Rezultati

umeritev			
48	82		
hslika	dslika	hnarava[cm]	dnarava[cm]
18,5	147	31,60417	251,125
23	159	39,29167	271,625
31	164	52,95833	280,1667
40	184	68,33333	314,3333
51	188	87,125	321,1667
51	184	87,125	314,3333
53	200	90,54167	341,6667
50,5	163	86,27083	278,4583
13,5	103	23,0625	175,9583



prilagajanje modela

- v_a = 5,5 m/s
- ali
- v_a = 8 m/s



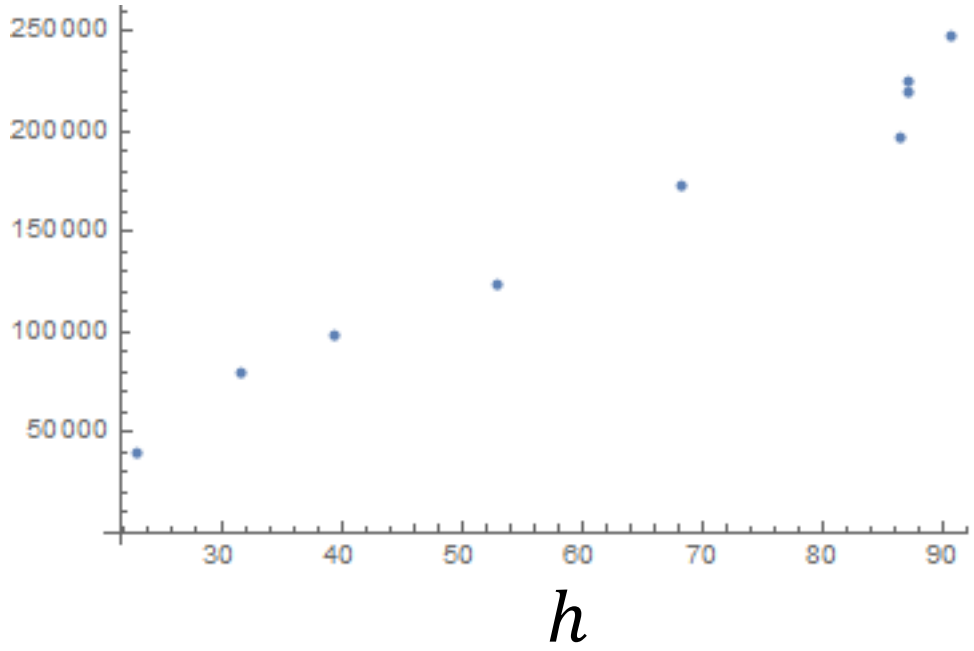
$$d = \frac{v_a\sqrt{2h}}{\sqrt{g}}$$

$$d = \sqrt{\frac{8v_a^2 h}{g} - 16h^2}$$

$$d^2 + 16h^2 = \frac{8v_a^2}{g}h$$

$$d^2 = \frac{2v_a^2}{g}h$$

$d^2 + 16h^2$



d^2