

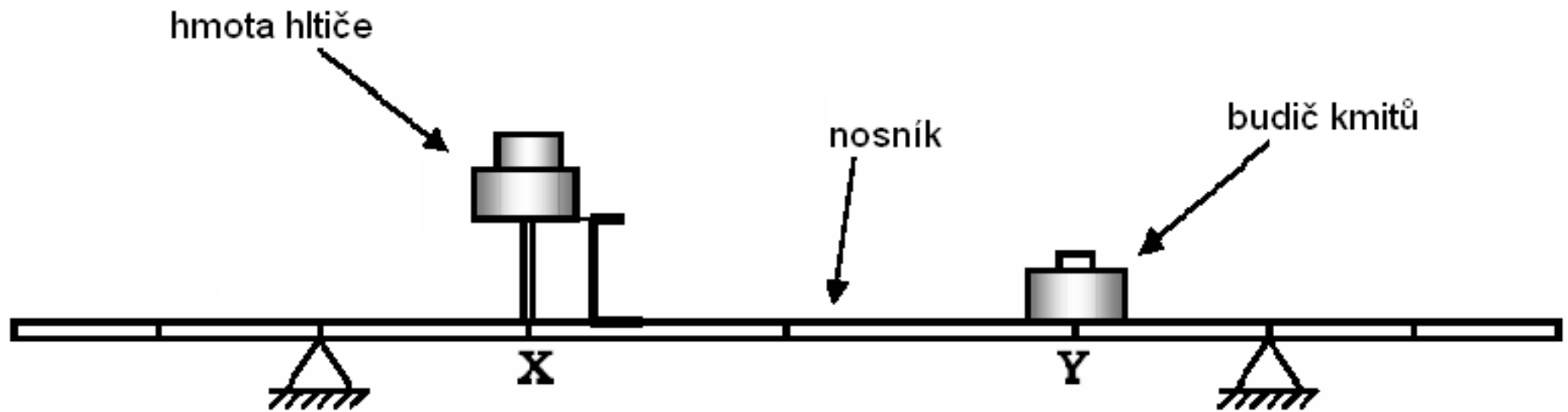
AKTIVNÍ TLUMENÍ VIBRACÍ PIEZOAKTUÁTOREM S MĚŘENÍM VIBRACÍ LASEROVÝM INTERFEROMETREM



Ondřej MAREK

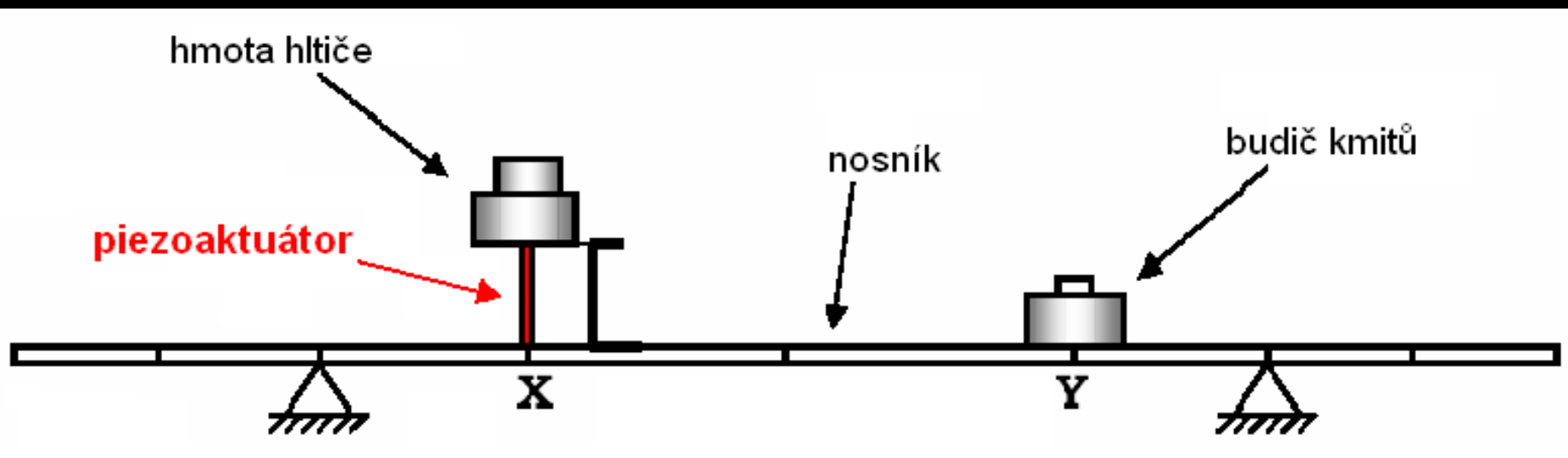
CÍL DIP. PRÁCE (1)

- Realizace aktivního tlumení vibrací na modelu vibrujícího nosníku



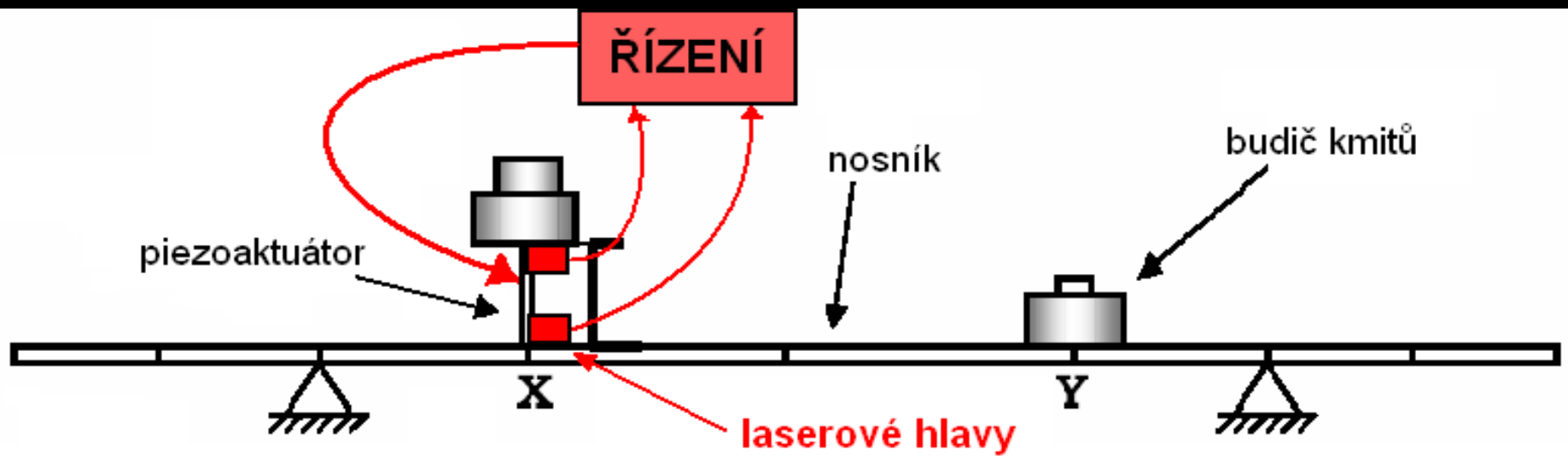
CÍL DIP. PRÁCE (2)

- Aktivní prvek - PIEZOAKTUÁTOR



CÍL DIP. PRÁCE (3)

- Pro výpočet zpětné vazby použít signál z laserového interferometru

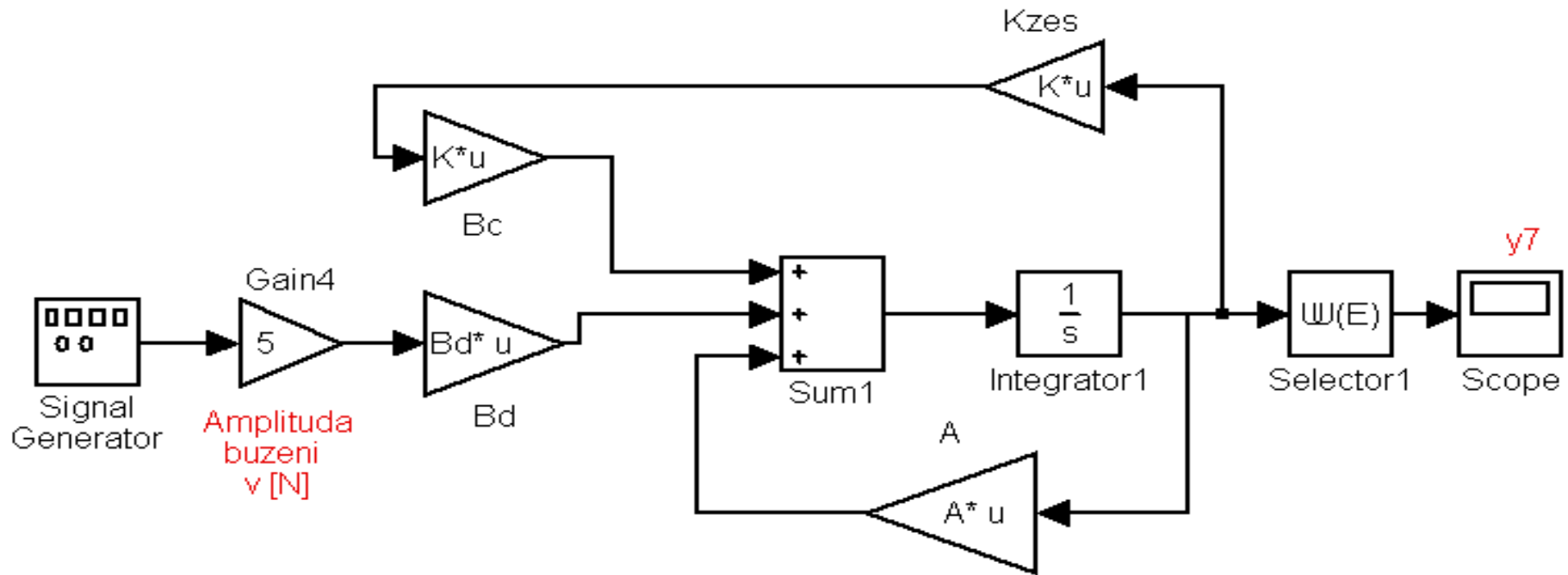


SIMULAČNÍ MODEL

- Matice M , K do dynamické rovnice získány metodou MKP
- Řízení pomocí plné stavové zpětné vazby (LQR)
- Optimalizace výstupní zpětné vazby pro různé výstupní signály a jejich kombinace (poloha, rychlost, zrychlení, rychlost + zrychlení, rychlost + poloha)

SIMULAČNÍ MODEL (2)

Výstupní zpětná vazba



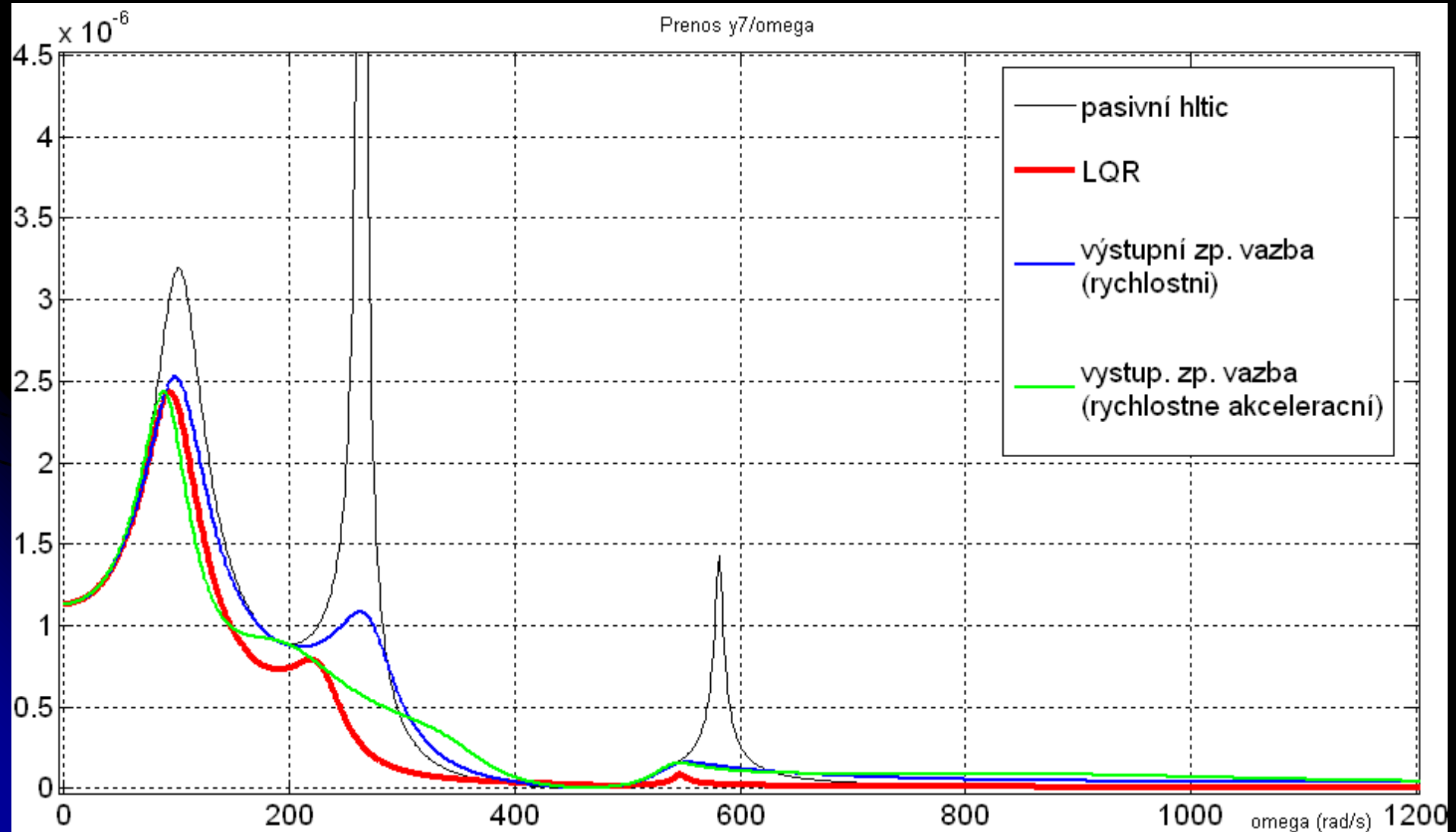
$$\dot{X} = AX + B_c \cdot F_a + B_d \cdot F_d$$

$$X = \begin{bmatrix} Y \\ \dot{Y} \end{bmatrix}$$

$$A = \begin{bmatrix} 0 & I \\ -M^{-1}K & -M^{-1}B \end{bmatrix}$$

$$F_{act} = (k1 \cdot \ddot{z} + k2 \cdot \ddot{y}) + k3 \cdot \dot{z} + k4 \cdot \dot{y} + k5 \cdot z + k6 \cdot y$$

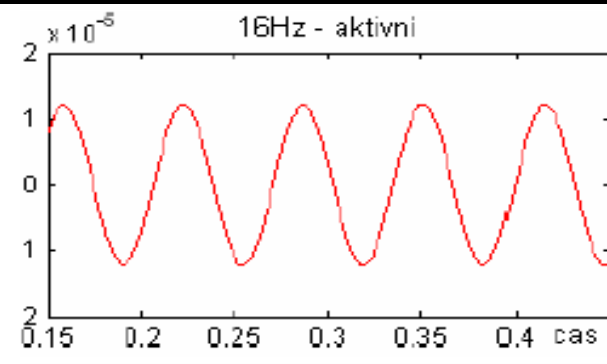
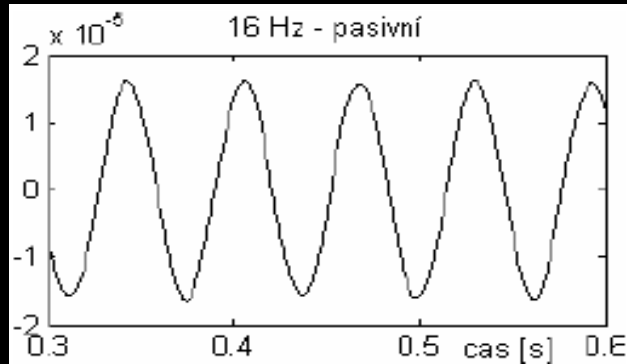
SIMULAČNÍ VÝSLEDKY



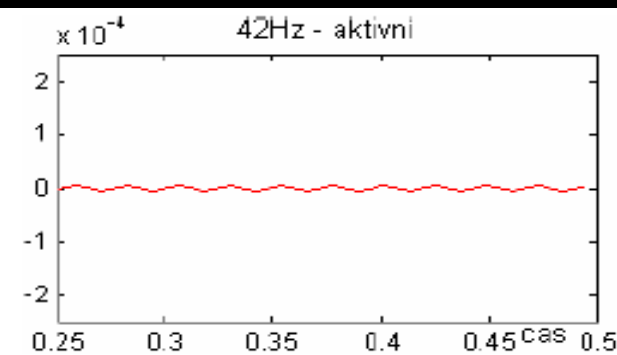
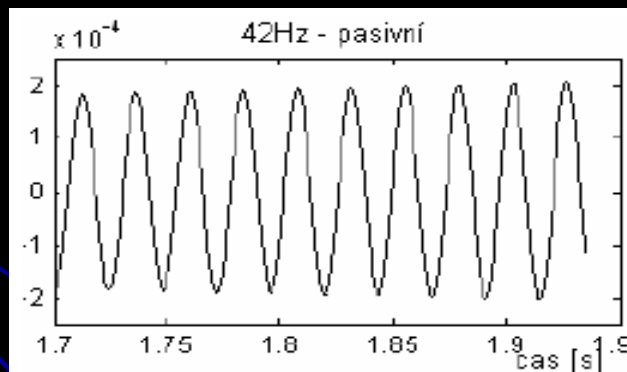
SIMULAČNÍ VÝSLEDKY

rychlostně akcelerační zp. vazba

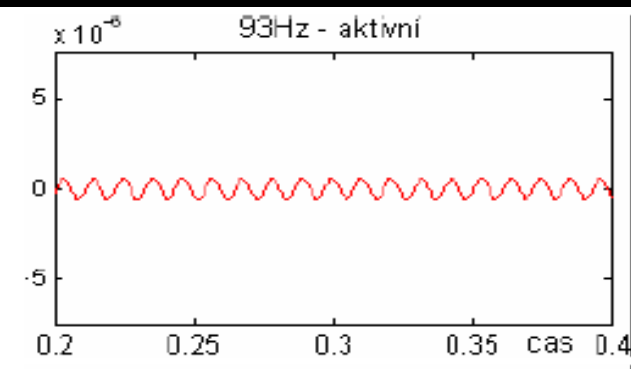
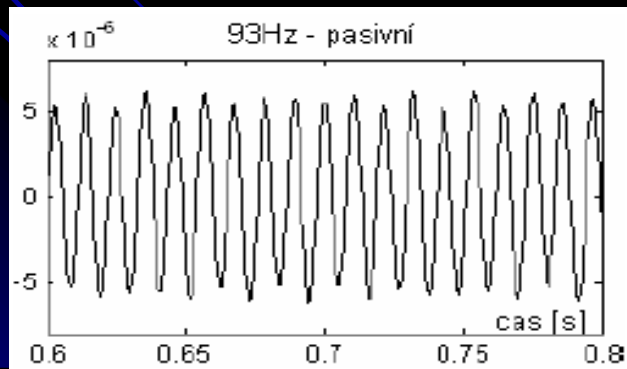
16 Hz



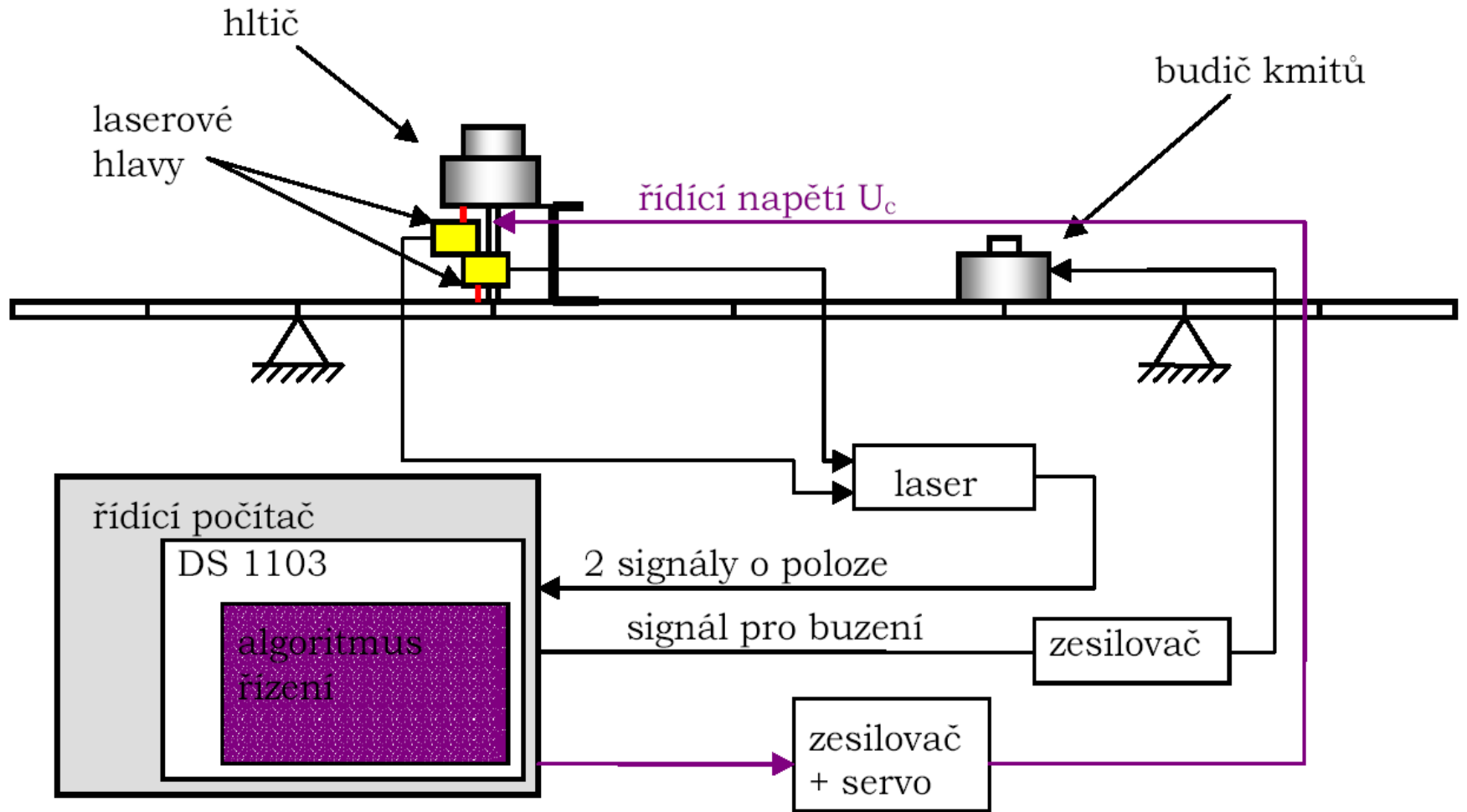
42 Hz



93 Hz



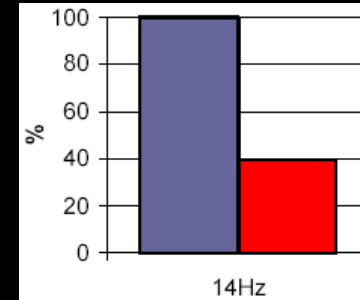
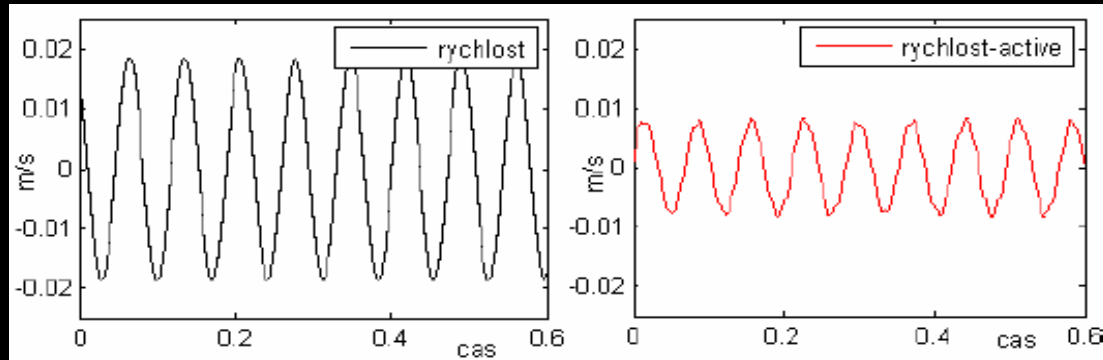
ZAPOJENÍ EXPERIMENTU



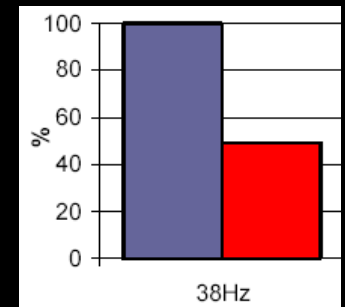
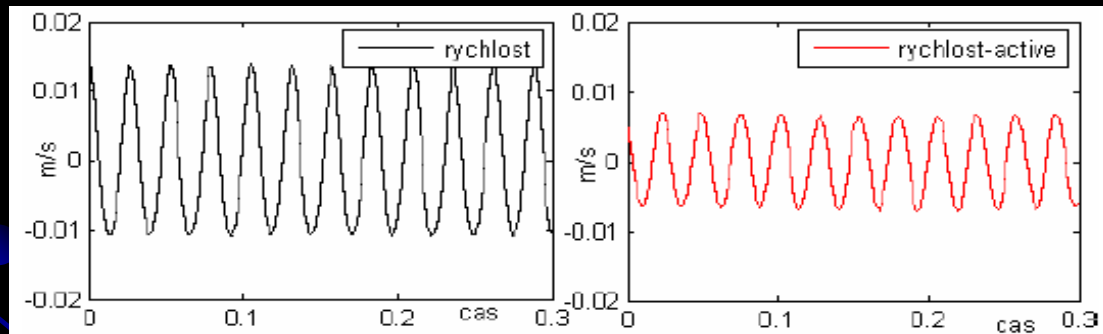
EXPERIMENTÁLNÍ VÝSLEDKY

rychlostní zpětná vazba

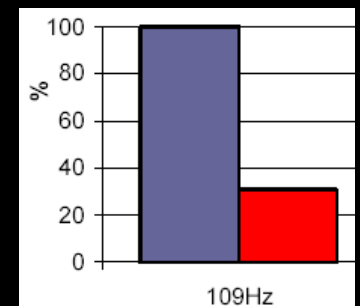
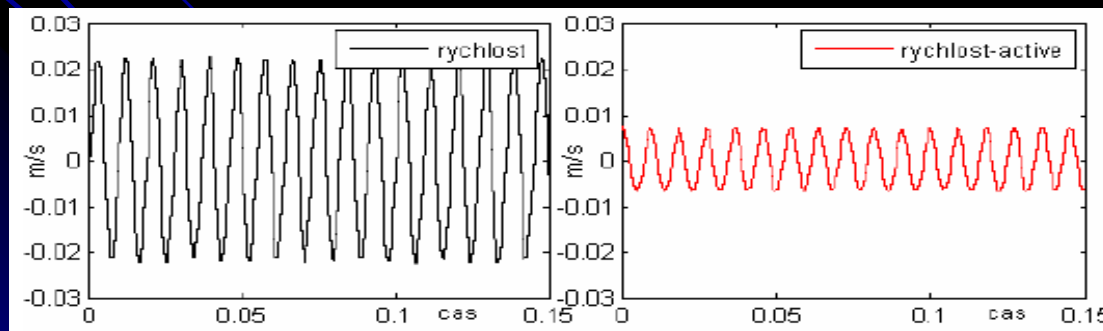
14 Hz



38 Hz



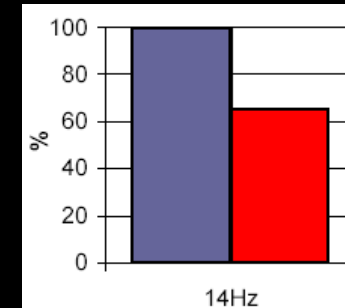
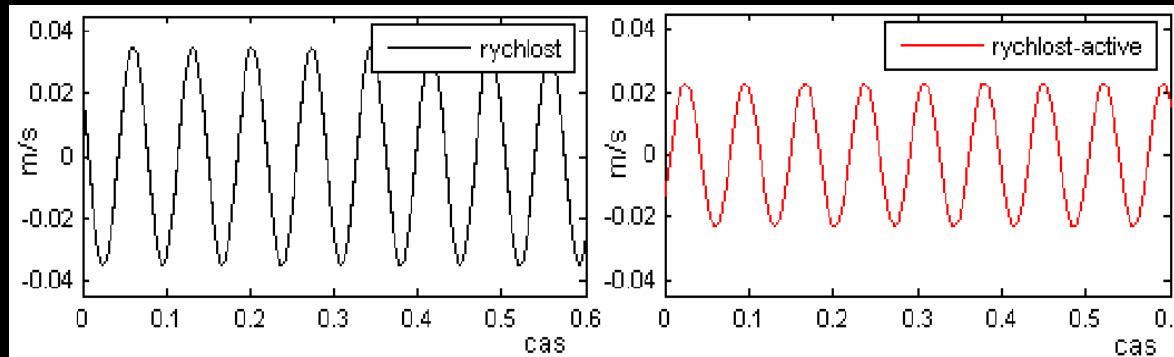
109 Hz



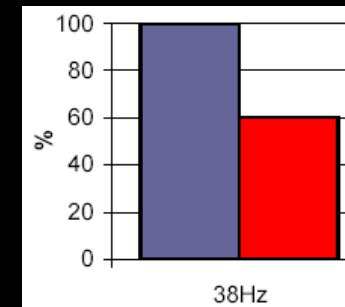
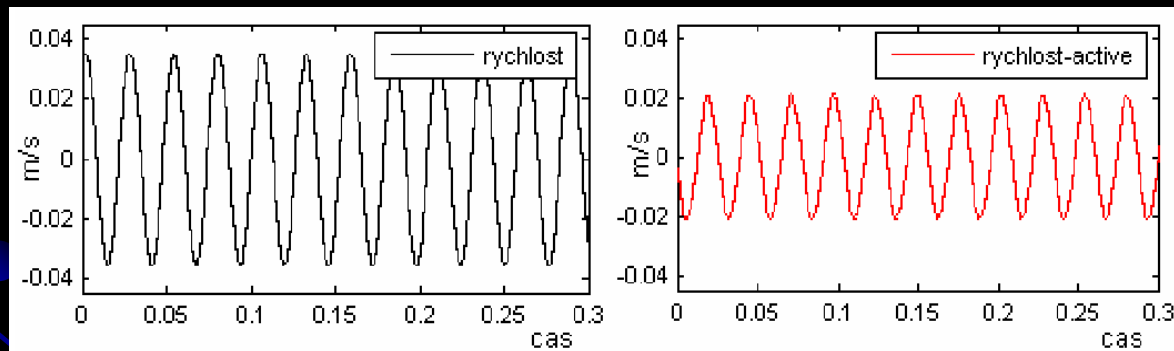
EXPERIMENTÁLNÍ VÝSLEDKY

rychlostně akcelerační zpětná vazba

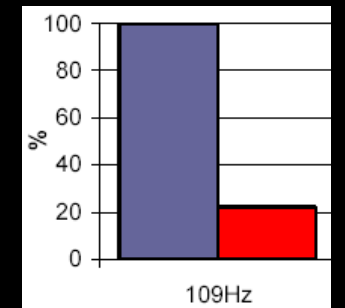
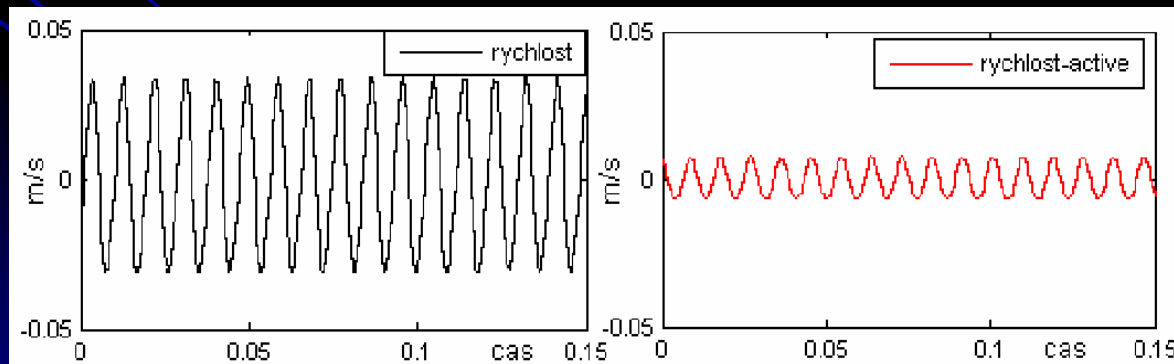
14 Hz



38 Hz



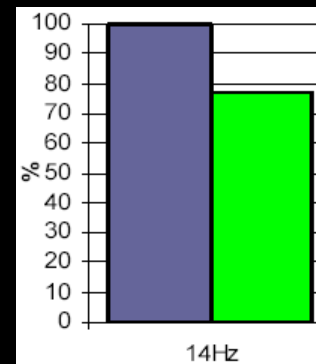
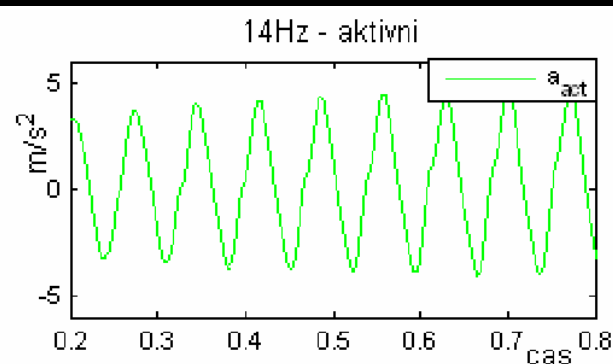
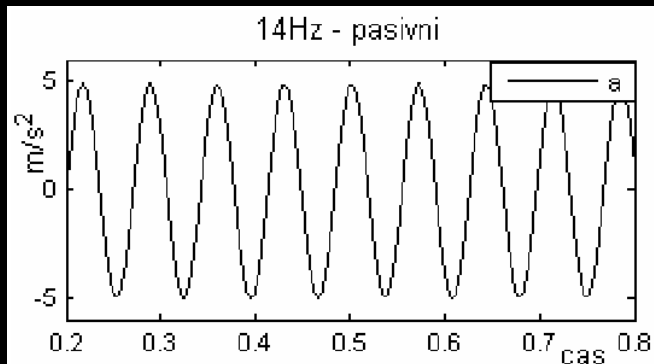
109 Hz



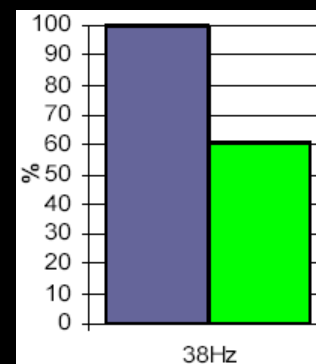
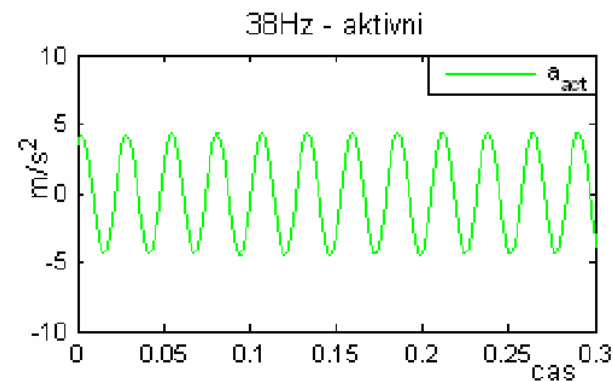
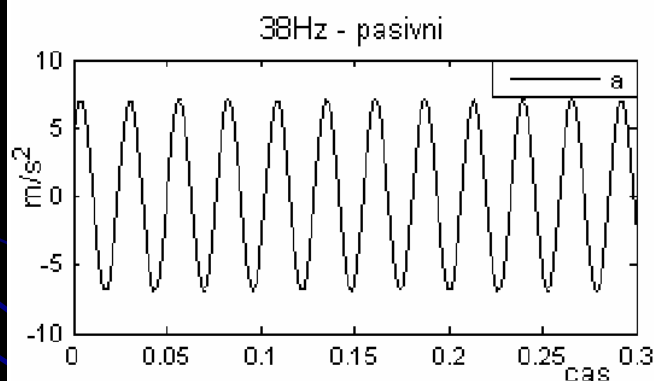
EXPERIMENTÁLNÍ VÝSLEDKY

rychlostně akcelerační ZV pomocí akcelerometrů

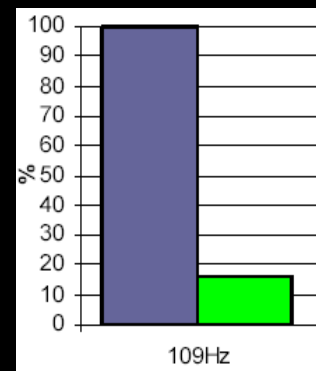
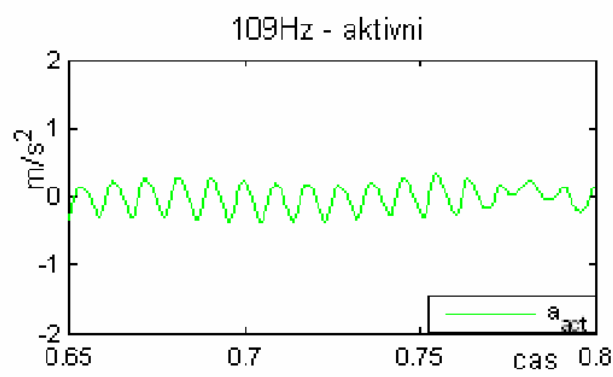
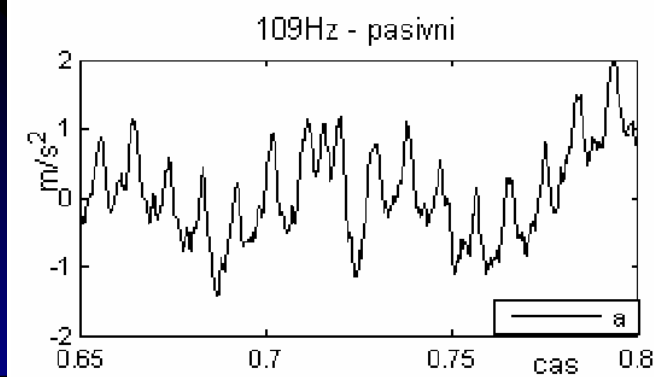
14 Hz



38 Hz



109 Hz



VIDEOUKÁZKA

