

## Sinteza linearnih sustava upravljanja – 1.MI

$$\dot{x}(t) = Ax(t) + Bu(t)$$

$$y(t) = Cx(t) + Du(t)$$

$$x(n) = \phi^n x(0) + \phi^{n-1} \Gamma u(0) + \phi^{n-2} \Gamma u(1) + \dots + \Gamma u(n-1)$$

$$C = [B \ AB \ A^2 B \ \dots \ A^{n-1} B] - \text{matrica upravljivosti (det! = 0)}$$

$$O = \begin{bmatrix} C \\ A \\ CA^2 \\ \vdots \\ CA^{n-1} \end{bmatrix} - \text{matrica osmotrivosti (det! = 0)}$$

$$\Delta_{CL}(s) = |sI - A + BL|; L = [K_1 \ K_2 \ \dots \ K_n] - \text{bez BL za izračun svojstvenih vrijednosti;}$$

$$u(t) = -Lx(t)$$

$$\Psi_i = (\lambda_{CLi} I - \phi)^{-1} \Gamma; \Psi_2^* = \left( \frac{\partial}{\partial \lambda} (\lambda_{CLi} I - \phi)^{-1} \Gamma \right) |_{\lambda = \lambda_z}$$

$$L = -[1 \ 1 \ 1 \ \dots \ 1] [\Psi_1 \ \Psi_2 \ \dots \ \Psi_n]^{-1} = -E_n \Psi^{-1}$$

$$A^{-1} = \frac{1}{\det A} \begin{bmatrix} A_{11} & \dots & A_{1n} \\ \vdots & \ddots & \vdots \\ A_{n1} & \dots & A_{nn} \end{bmatrix}^T$$

$$L = [0 \ 0 \ \dots \ 1] C^{-1} \alpha_c(\phi); \text{ prva matrica ide do } n; \alpha_c(\phi) = \phi^2 + a\phi + bI$$

$$\text{Iz } G(s) \text{ u matrice stanja } x_2 = y; x_1 = x_2'$$

$$G(s) = C(sI - A)^{-1}B + D$$

### Uvođenje integratora:

$$\bar{A} = \begin{bmatrix} A & 0 \\ -C & 0 \end{bmatrix} \text{ (1 za diskretne)}; \bar{B} = \begin{bmatrix} B \\ 0 \end{bmatrix}$$

$$C = [C \ 0]; \bar{L} = -[L \ L_i]$$

Prefiltar:

$$V = 1/G(0) = [C(BL - A)^{-1}B]^{-1}$$

