u -> input
x -> state
y -> output

$u \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_m \end{bmatrix}$ x - -

MM - isi
SS - MM

$$\begin{cases} \dot{x}(t) = Ax(t) + b\,u(t) & \text{-> state eq} \\ y(t) = c^T x(t) + d\,u(t) & \text{-> output eq.} \end{cases}$$

IO - MM input -> output

$$\sum_{\nu=0}^{n} a_\nu y^{(\nu)}(t) = \sum_{\mu=0}^{m} b_\mu u^{(\mu)}(t)$$

$m \leq n$

-> reprezentare functională a unui sistem pocos

Clasificarea

-> continuu (s)
-> discret (z)

System Dynamic in Timp Continuu

$\dot{x}(t) = f(t, x(t), u(t))$ -> state
$y(t) = f(t, x(t), u(t))$ -> output

$x(t_0)$ specificat

$x(t)$ -> starea $(t, x(t))$ -> faza sistemului

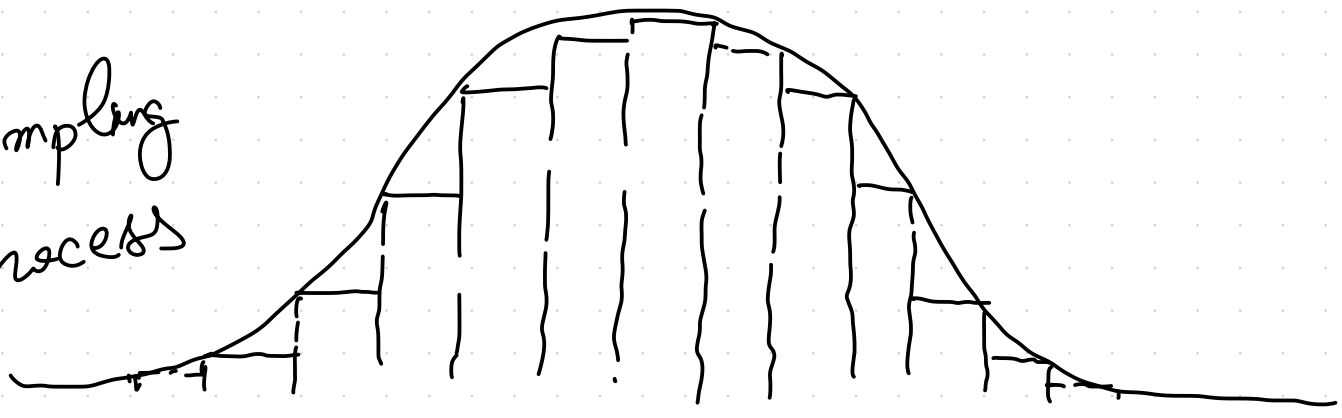
Sisteme multivariabile Multi Input Multi Out

System in timp discret

t_k (la momentul T_e / T_s) -> sampling perisd

$u(t_k) = u_k$ $y(t_k) = y_k$ -> samples

Sampling Process



$x(k+1) = f(k, x(k), u(k))$ → state

$y(k) = g(k, x(k), u(k))$ → output

$k \in \mathbb{Z}(N)$ m. de momente de timp discret

$t_k = k T_e$

$k == t$

(Proportional Integrator)

Controller PI

$$u(t) = k_p e(t) + k_i \int_0^t e(\tau) d\tau$$

$e(t) = y_2(t) - y(t)$ eroarea de control

parametri: k_p → proportional gain

k_i → integral gain