

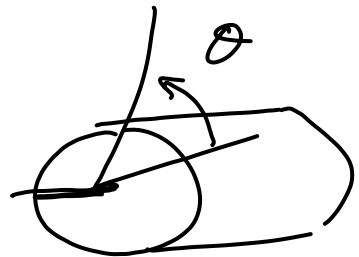
SISTEMI ELETTROMECCANICI

J momento di inerzia

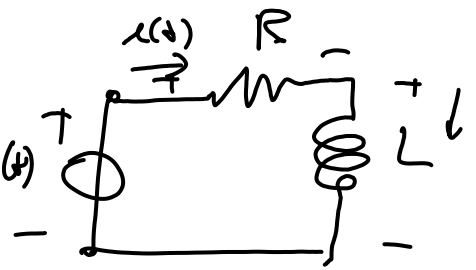
q attriti

$$-J \ddot{\theta} - b \dot{\theta}(t) - c_{est}(t) + c_{em}(t) = 0$$

Sistema meccanico



$$V(t) = R \underline{i(t)} + L \frac{d}{dt} \underline{i(t)} + \underline{v_{me}(t)}$$

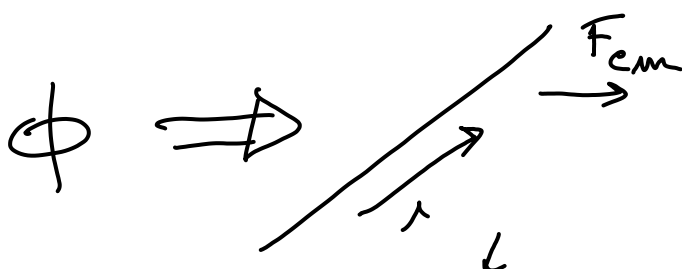


$$v_R(t) = R i(t)$$

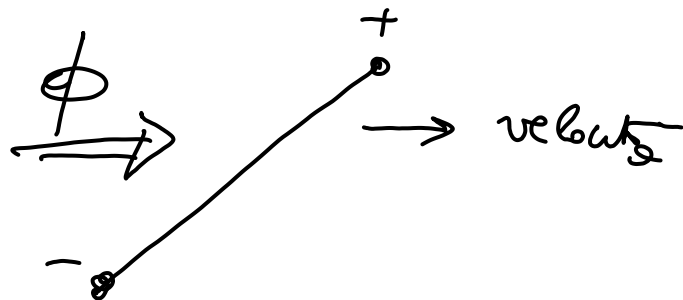
$$v_L(t) = L \frac{d}{dt} i(t)$$

$$c_{em}(t) = ?$$

$$v_{me}(t) = ?$$



$$c_{em}(t) = \underline{h} i(t)$$



$$v_{me}(t) = \underline{h} \dot{\theta}(t)$$

$$\begin{cases} -J\ddot{\theta} - q\dot{\theta} + C_{ext} + h\theta = 0 \\ V(t) = R i + L \dot{i} + h\dot{\theta} \end{cases}$$

$$x_1(t) = i(t)$$

$$x_3(t) = \theta(t)$$

$$x_2(t) = \dot{\theta}(t)$$

$$u_1(t) = V(t)$$

$$u_2(t) = C_{ext}(t)$$

$$\rightarrow \dot{x}_1 = \left(\frac{1}{L}\right) (-R x_1 - h x_2 + u_1)$$

$$\dot{x}_3 = \dot{\theta} = x_2$$

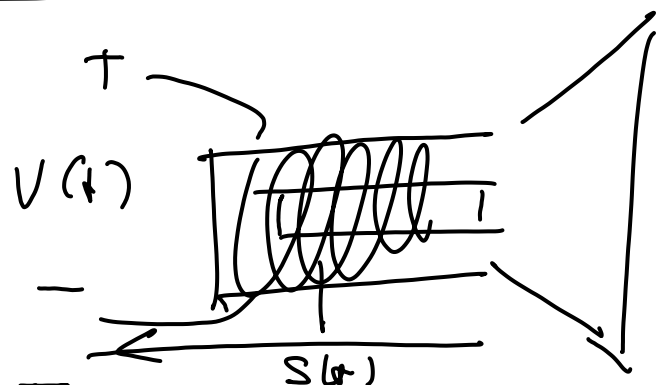
$$\rightarrow \dot{x}_2 = \ddot{\theta} = \frac{1}{J} (-q x_2 + h x_1 + u_2)$$

$$A = \begin{bmatrix} -\frac{R}{L} & -\frac{h}{L} & 0 \\ \frac{h}{J} & -\frac{q}{J} & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} \frac{1}{L} & 0 \\ 0 & \frac{1}{J} \\ 0 & 0 \end{bmatrix}$$

Diffusore cartico

$$\theta(t) \rightarrow S(t)$$



$$\begin{cases} -m\ddot{S} - q\dot{S} - kS + F_{em} = 0 \\ V(t) = R i + L \dot{i} + h\dot{S} \end{cases}$$

$$x_1 = i$$

$$x_2 = S$$

$$x_3 = \dot{S}$$

Esercizi

ES. 14

Pagerank

Pg 1

2
3
4

2

3

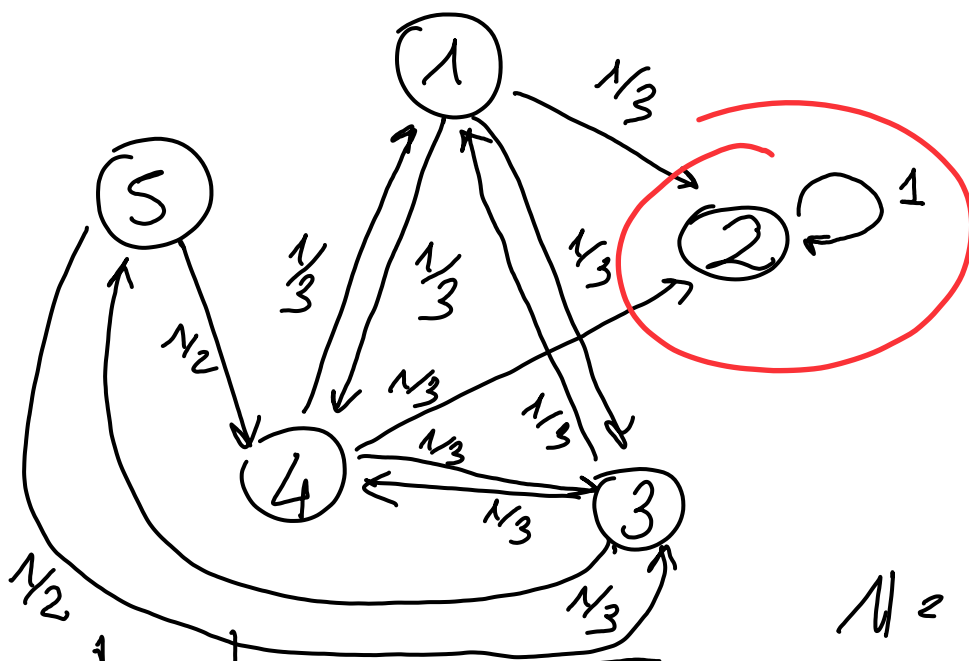
1
4
5

4

1
2
3

5

3
4



$$11 = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

$A =$

0	0	1/3	1/3	0
1/3	1	0	1/3	0
1/3	0	0	1/3	1/2
1/3	0	1/3	0	1/2
0	0	1/3	0	0

$$11^T A = 11^T$$

$$A v = v$$

$$x(k+1) = A x(k)$$

$$x(\infty) = A x(\infty)$$

$$A v = v$$

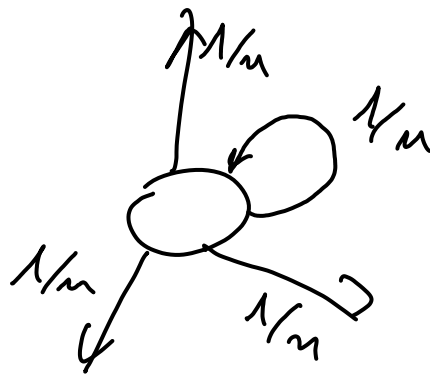
$$v = \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\text{Si } f_{\text{roz}} P = 0.85 = \frac{17}{20}$$

$$1-P = 0.15 = \frac{3}{20}$$

1) Se não há um colono relativo a um trophob, Questo diventa

$$\rightarrow \begin{bmatrix} 1/n \\ 1/n \\ 1/n \\ \vdots \end{bmatrix}$$



$$\begin{bmatrix} 1/5 \\ 1/5 \\ 1/5 \\ 1/5 \\ 1/5 \end{bmatrix}$$

2) Se non sono in un trophob

$$P(\text{Colono ou free}) + (1-P) \begin{bmatrix} 1/n \\ 1/n \\ \vdots \end{bmatrix}$$

$$\tilde{A}_{2 \times 600} \begin{bmatrix} 18 & 120 & 188 & 188 & 18 \\ 188 & 120 & 18 & 188 & 18 \\ 188 & 120 & 18 & 188 & 273 \\ 188 & 120 & 188 & 18 & 273 \\ 18 & 120 & 188 & 18 & 18 \end{bmatrix}$$

$$\tilde{a}_{ij} = p a_{ij} + (1-p) \frac{1}{5} = \frac{17}{20} a_{ij} + \frac{3}{20} \frac{1}{5}$$

$$a_{ij} = 0 \quad \tilde{a}_{ij} = \frac{3}{100} = \frac{18}{600} \leftarrow$$

$$a_{ij} = \frac{1}{3} \quad \tilde{a}_{ij} = \frac{17}{20} \frac{1}{3} + \frac{3}{20} \frac{1}{5} = \frac{188}{600}$$

$$a_{ij} = \frac{1}{2} \quad \tilde{a}_{ij} = \frac{17}{20} \frac{1}{2} + \frac{3}{20} \frac{1}{5} = \frac{273}{600}$$

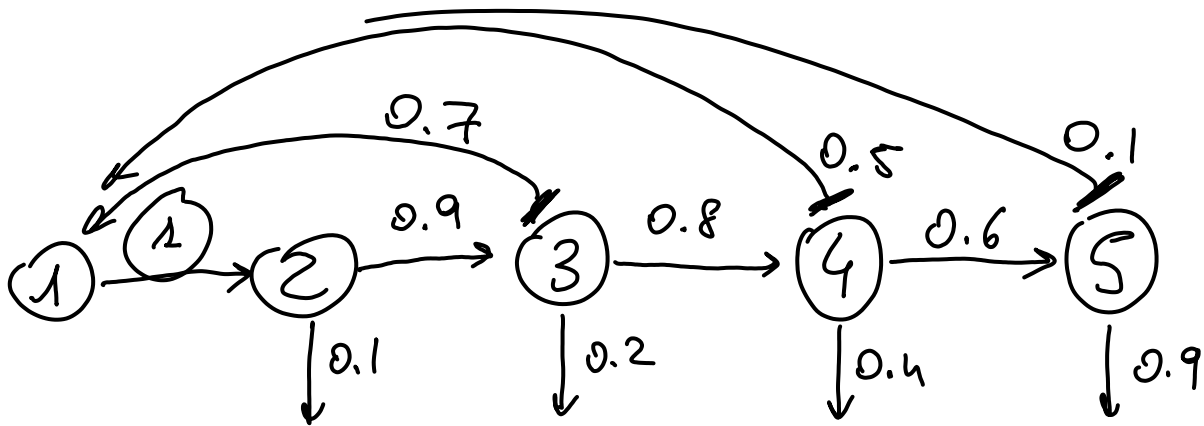
$$X(k) =$$

$$X(k+1) = A X(k)$$

$$X(1) = A X(0)$$

$$X(2) = A X(1) = A A X(0)$$

$$X(k) = A^k X(0)$$



$$X_1(k+1) - \cancel{X_1(k)} = 0.7 X_3(k) + 0.5 X_4(k) + 0.1 X_5(k) - \cancel{X_1(k)}$$

$$X_2(k+1) - \cancel{X_2(k)} = \underline{X_1(k)} - 0.9 \cancel{X_2(k)} - 0.1 \cancel{X_2(k)}$$

$$X_3(k+1) - \cancel{X_3(k)} = \underline{0.9 X_2(k)} - 0.2 \cancel{X_3(k)} - 0.8 \cancel{X_3(k)}$$

$$X_4(k+1) - \cancel{X_4(k)} = \underline{0.8 X_3(k)} - 0.4 \cancel{X_4(k)} - 0.6 \cancel{X_4(k)}$$

$$X_5(k+1) - X_5(k) = 0.6 X_4(k) - 0.9 X_5(k)$$

$$X_5(k+1) = 0.6 X_4(k) + 0.1 X_5(k)$$

$$A = \begin{bmatrix} 0 & 0 & 0.7 & 0.5 & 0.1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 0.9 & 0 & 0 & 0 \\ 0 & 0 & 0.8 & 0 & 0 \\ 0 & 0 & 0 & 0.6 & 0.1 \end{bmatrix}$$

$$X(k+1) = A X(k)$$

$$X(k) = A^k X(0)$$

$$S_i(k) = \frac{X_i(k)}{N(k)}$$

$$N(k) = X_1(k) + X_2(k) + \dots$$

$S(k)$ werden als ~~normalisiert~~

Seq

$S(k) \rightarrow \text{Seq}$

$$X(k) = N(k) \text{Seq} \quad \forall k$$

$$\frac{X_i(k)}{N(k)} = S_i(k) \rightarrow \text{Seq}_{i,1}$$

$$X_i(k) \approx N(k) \text{Seq}_{i,1}$$

$$\lambda_i(k) = 1$$

$$X(k+1) = N(k+1) \text{Seq}$$

$$A X(k) = A (N(k) \text{Seq})$$

$\Rightarrow$

$$\left(\frac{N(k+1)}{N(k)} \right) \text{Seq} = A \text{Seq}$$

$$\lambda(k) \text{Seq}_{i,1} = (A \text{Seq})_{i,1}$$

$$A \text{Seq} = A \text{Seq}$$

$$\frac{N(k+1)}{N(k)} = A$$

$$N(k+1) = A N(k)$$

ES. 18

