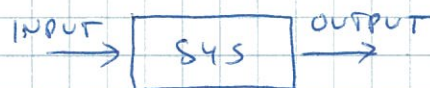
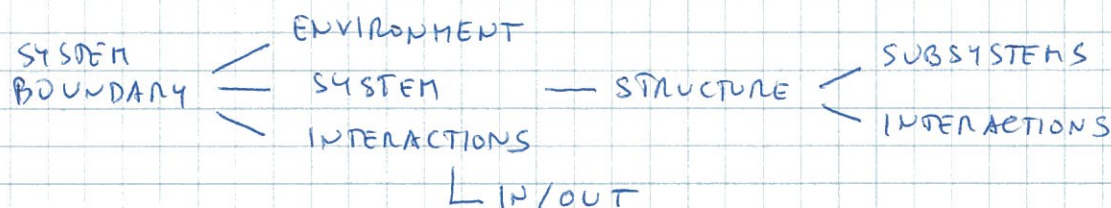
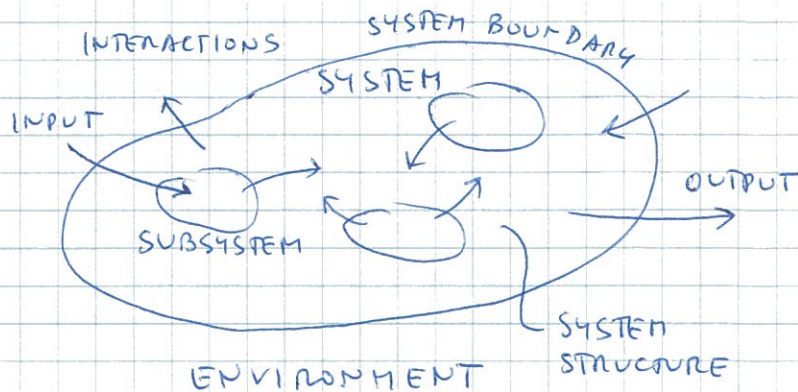


DYNAMIC SYSTEMS - MODELING & IDENTIFICATION

(11)

1. SYSTEMS & SIGNALS



SYSTEM - LINEAR/NONLINEAR:

$$S[u_i] = y_i$$

$$S[\alpha_1 u_1 + \alpha_2 u_2] = \alpha_1 S[u_1] + \alpha_2 S[u_2]$$

- DYNAMIC / STATIC: $y(t) = S[\text{ACTUAL } u(t), \text{PAST } u(t), \text{PAST } y(t)]$
(MEMORY ~ STATE ~ FEEDBACK)

- TIME INVARIANT / TIME VARYING: $S[u(t)] = y(t)$
 $S[u(t+\tau)] = y(t+\tau)$

↳ IMPORTANT: LTI - LINEAR TIME INVARIANT SYSTEM

- FADING MEMORY: PRESENT (OUT) MORE & MORE INDEPENDENT FROM THE PAST (FORGETTING)

- DETERMINISTIC / STOCHASTIC:

$$S[u(t), \omega] = y(t, \omega)$$

↑ SPECIFIC ↑
RANDOM EVENT

- CAUSAL / NON CAUSAL

$$y(t) = S[\text{ACT } u(t), \text{PAST } u(t), \text{FUTURE } u(t) (!?)]$$

EG: $y_t = \frac{1}{3}(x_t + x_{t-1} + x_{t-2})$ $y_t = \frac{1}{3}(x_{t+1} + x_t + x_{t-1})$