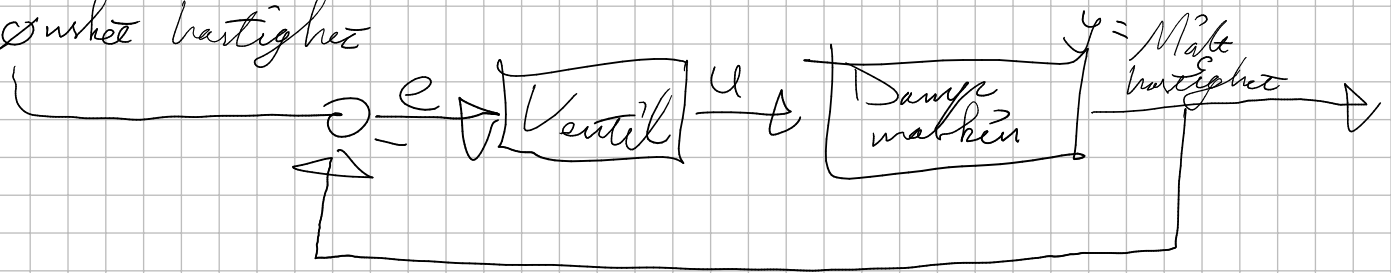


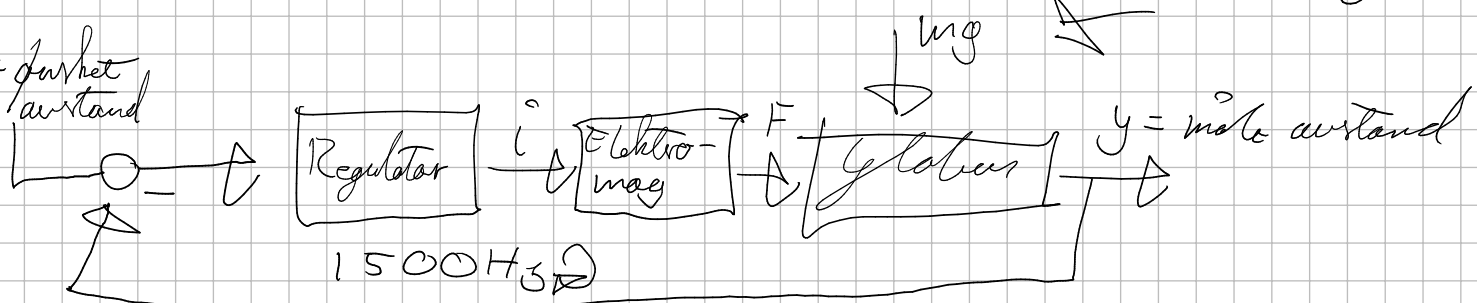
Vattens hastighetsregulator

v = önskt hastighet

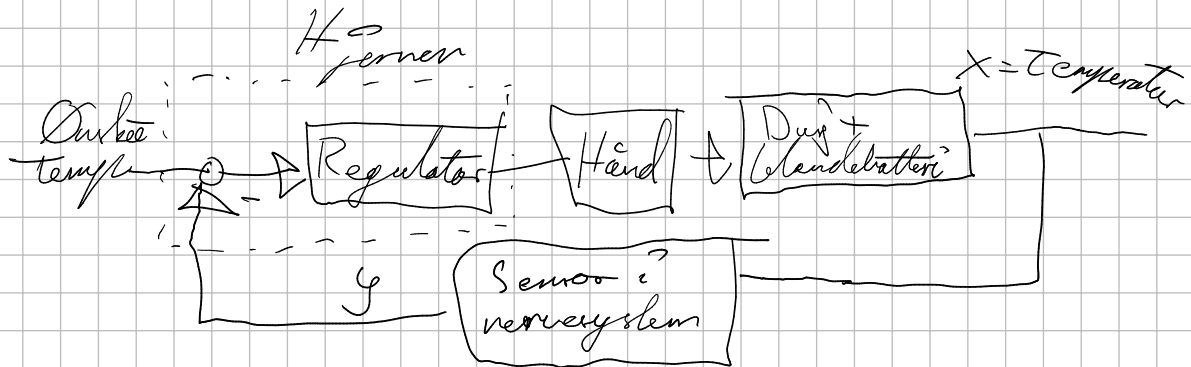
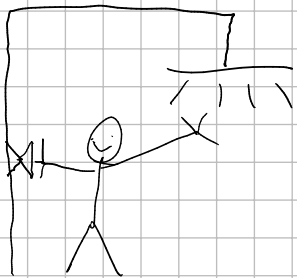


Förstyrelse !!!

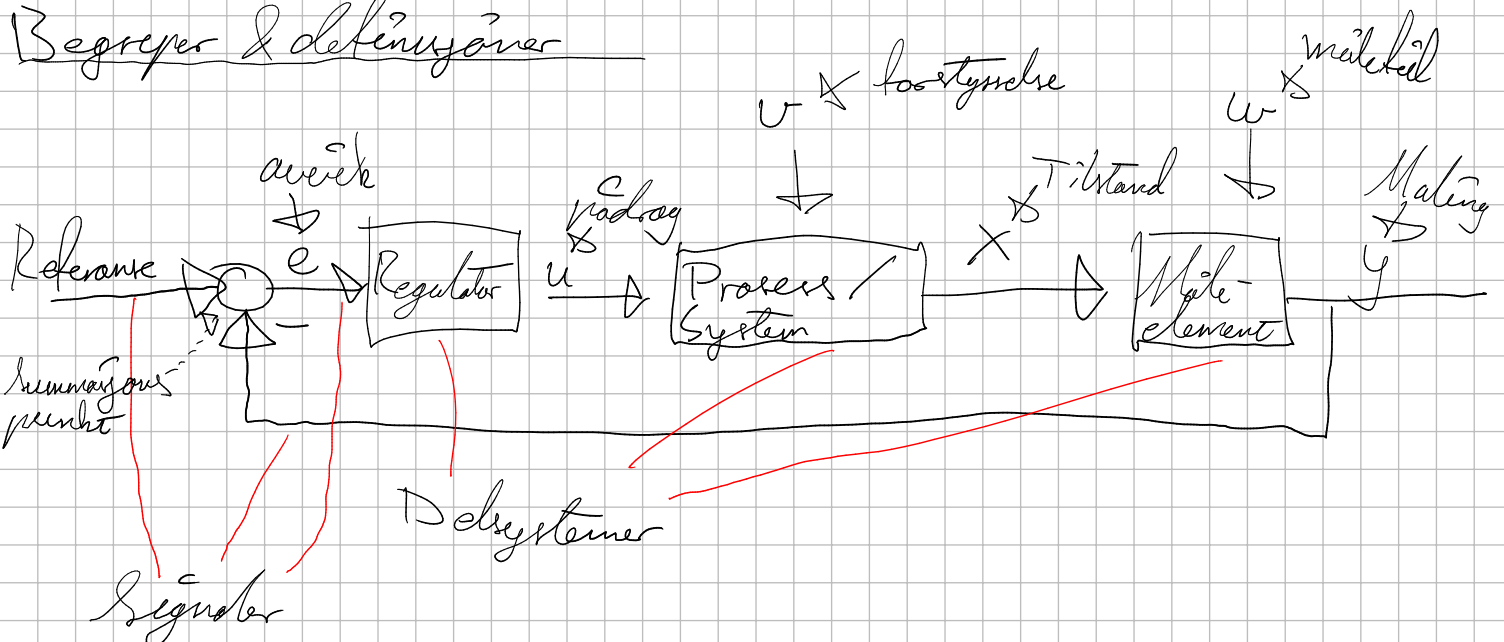
v = önskt avstånd



Dusjekampeler



Begreper & definitioner



Signale

abweich: $e(t) = r(t) - y(t)$

maßgeb: $u(t)$

tilstand: $x(t)$

referenz: $r(t)$

Systeme

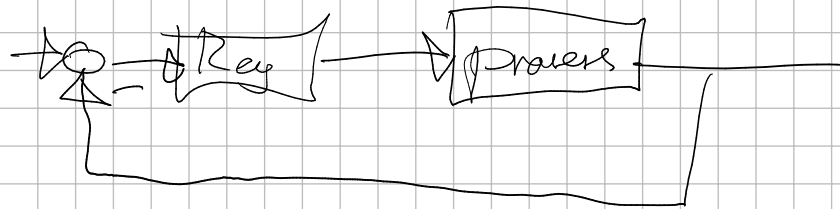
Regulator: algorithm

Prozess

Mäßeinheit

Kap 3

↓ Modellierung für
regulierung



Differensialligninger

$$\frac{dx}{dt} = f(x, u) \quad \text{dynamisk}$$

En løsning vil være på formen $x(t)$

$$\frac{dx}{dt} = x' = \dot{x}$$

$$\frac{d^2x}{dt^2} = x'' = \ddot{x}$$

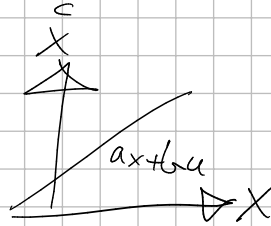
Lineare førsteordens differential

$$\dot{x} = f(x, u) = \underbrace{ax + bu}_{\text{kanon}}$$

Ligning på tilstandsform

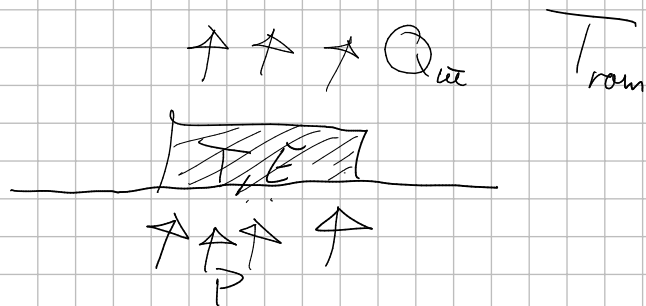
x er tilstand

u er pådrag



Eksempel 3

Matematisk modell av temper i en kokeplate



Energiløsløse

Endring av energi
i system per tid

= Tilført effekt - Avgitt effekt

$$[J/s] = [W]$$

$$\dot{E} = P - Q_{ut}$$

$$E = CT$$

↑
Varmekapitet
antatt konstant

$$\text{avkjøling} = Q_{ut} = k(T - T_{rom})$$

↑
Varmesegangstall

$$\dot{E} = P - Q_{ut}$$

$$C\dot{T} = P - k(T - T_{rom})$$

$$\dot{T} = -\frac{k}{C}T + \frac{1}{C}P + \frac{k}{C}T_{rom}$$

$$\boxed{\dot{T} = -\frac{k}{C}T + \frac{1}{C}(P + kT_{rom})}$$

Pa formen $\dot{x} = ax + b$ (b u)

$$x = T$$

$$a = -\frac{k}{C}$$

$$b = \frac{1}{C}(P + kT_{rom})$$

↑
u