PHOTORESIST MODEL

$$\begin{cases} \partial_t c(\underline{x},t) = -\sum_i s_i \left| w_i(\cdot,\cdot) \right|^2 \cdot c(\cdot,\cdot) \\ \quad \underline{x} \in V_r \;;\; 0 \leq t \leq T \\ c(\underline{x}, t=0) = c_0 \end{cases}$$

$c(\cdot,\cdot) :=$ dye concentration

$s_i \quad :=$ dye sensitivity to λ_i

WAVENUMBERS

$$k_i = m_1^i - j(a_1^i \cdot c(\underline{x},t) + a_2^i) \;;\; \underline{x} \in V_r$$

$$\quad = m_2^i \qquad\qquad\qquad\qquad\qquad ;\underline{x} \in V_x$$

$a_1^i \propto$ resist actinic absorbance

$a_2^i \propto$ resin absorption

OPTIMISATION

WHAT

INPUT

lamp spectr.

2 or more λ's

mask Xmitt.

complex (?)

WHY

STD. WAVES

DIFFRACTION

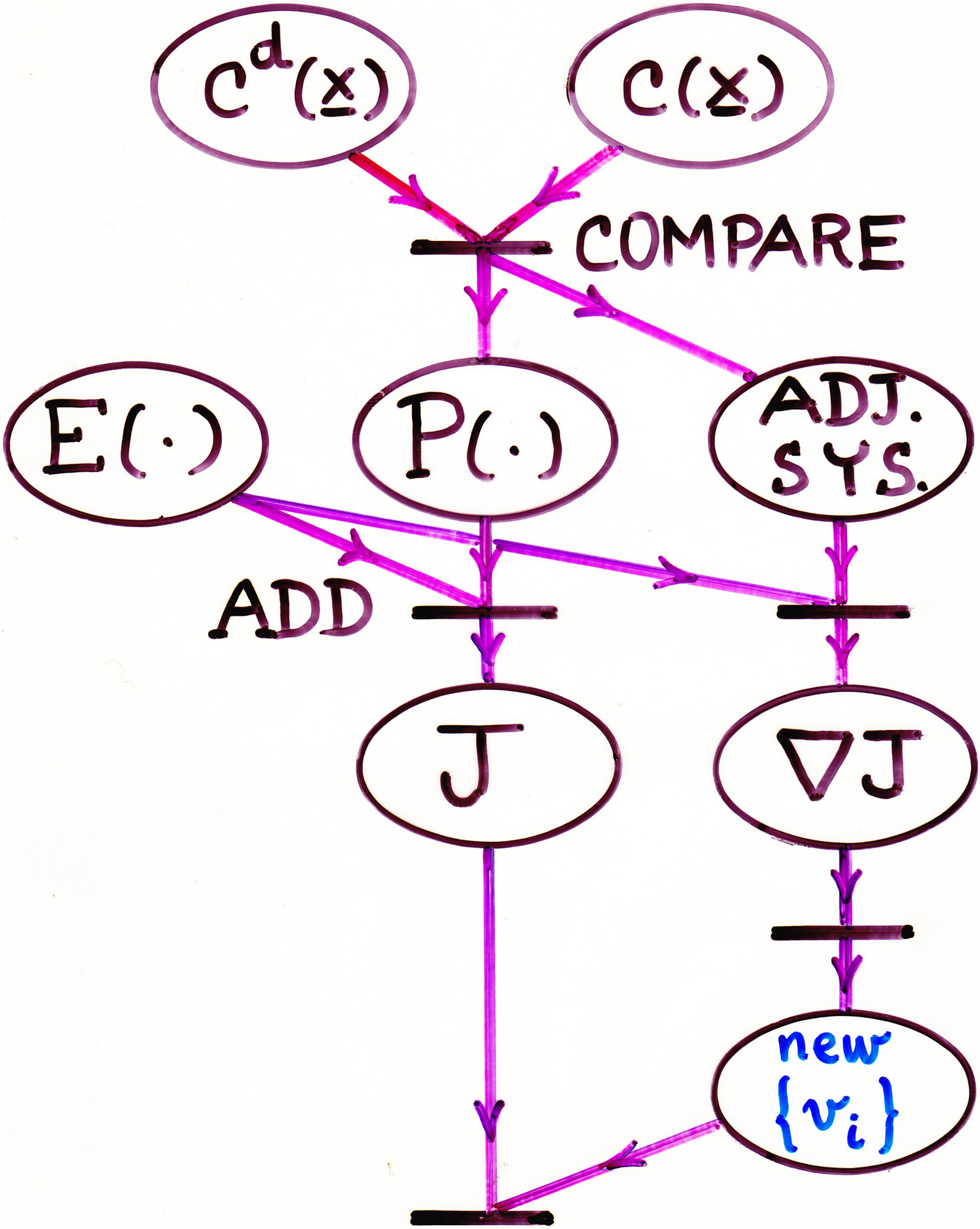
HOW

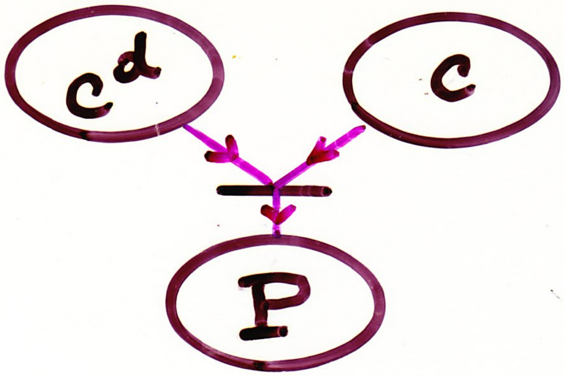
DISCRETE

GRADIENT

Lions-Chavent

INVERSE PROBLEM (OPTIMISATION)





$c^d(\underline{x}) :=$ desired dye concentration

$c(\underline{x}, T) :=$ actual final dye concentration

Why can $c(\underline{x}, T)$ differ from $c^d(\underline{x})$?

- diffraction
- standing waves

$$P(\cdot) := \int_{V_r} dV_r \left| c_d(\underline{x}) - c(\underline{x}, T) \right|^2$$

integrated square error

Since $c(\underline{x}, T) = c(\{v_i(\cdot)\}, \underline{x}, T)$

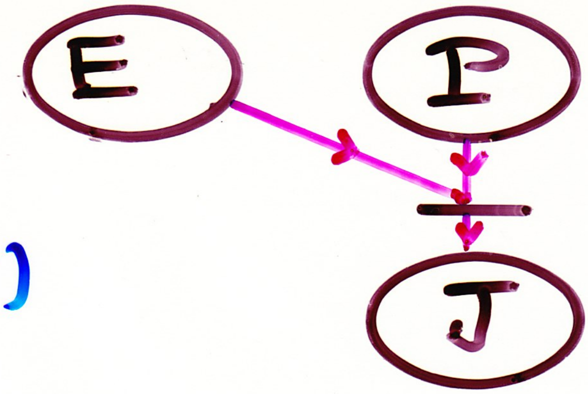
then $P = P(\{v_i(\cdot)\})$

Notation:

$$\{v_i(\cdot)\} := \underline{v}(\cdot)$$

$$\{w_i(\cdot)\} := \underline{w}(\cdot)$$

Optimisation :=



search for the best input $\underline{v}^{o}(\underline{x})$ such that

$$J(\underline{v}^{o}) := P(\underline{v}^{o}) + E(\underline{v}^{o})$$

is minimum

$E(\underline{v}) :=$ "economical" term, containing constraints on input.

$J(\underline{v}) :=$ cost functional

Why are inputs constrained ?
How ?
Does a minimising $\underline{v}^{o}$ exist?