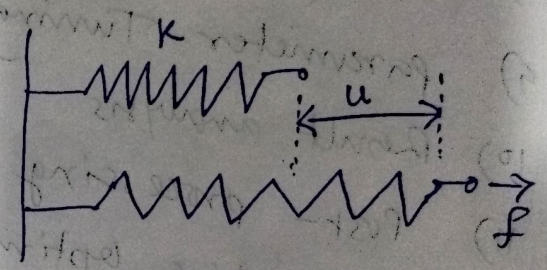
topology optimization

→ iterative process

① Sizing
② Shape
③ topology [removing the unwanted load that leads to more wt.]

→ changing material concentration from one place to another place



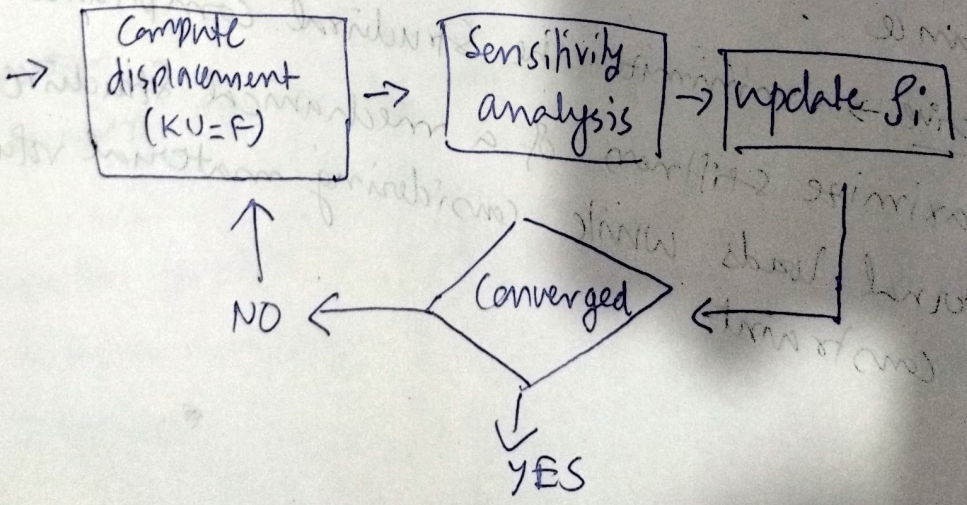
Minimize → $c = \frac{1}{2} U^T k U$

Static equation → $\boxed{ku = f}$

$$\rho_i = \begin{cases} 1 & \text{(Solid)} \\ 0 & \text{(void)} \end{cases}, \forall i \text{ [design variables]}$$

$\rho_i \in [0, 1]$

volume constraints ⇒ $g = \sum_i \rho_i - V_0 \leq 0$



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→ Structural topology ((cdc → PCA))
→ Def ✓
→ working ✓
→ working principles ✓
→ formula ✓
→

Ant Colony Optimization [Human Code]

Topology :- [distribution]

① optimal Shape
② material Distribution
→ modelling, Shape, material Quantity

③ objective → methodology, objectives

$f(x)$

$x \subseteq \mathbb{R}^n$

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$g_i(f) \leq 0 \quad i = 1, 2, 3 \ldots$