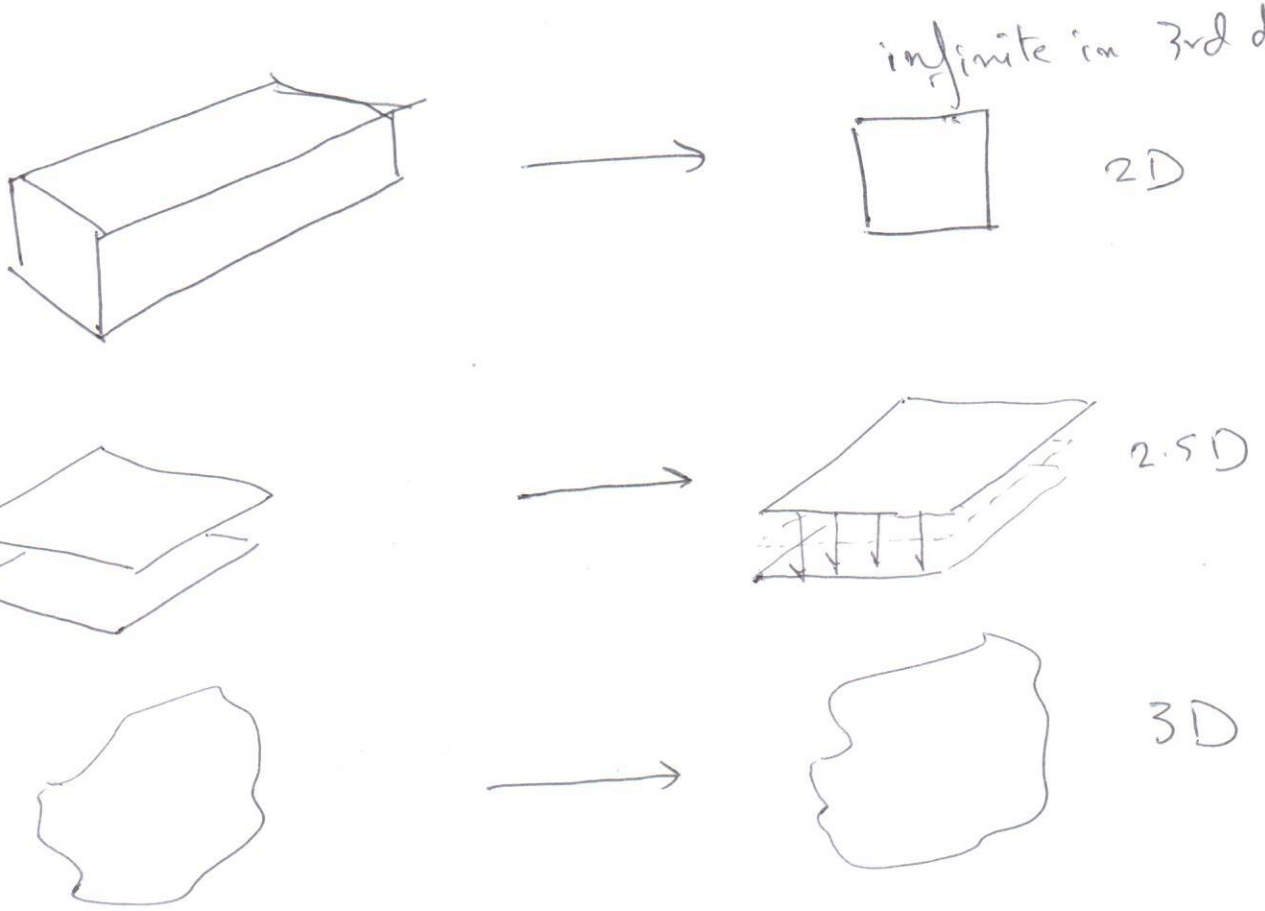
E8 202 Class 4.

2D vs 2.5D vs 3D.



What are the limitations of 2D?

What are the limitations of 2.5D?

What are the limitations of 3D?
if any (think mesh)

EM eqⁿ :-

$$\nabla \times E = -j\omega B$$

$$\nabla \times H = j\omega D + J$$

$$\nabla \cdot D = \rho \longrightarrow \nabla \cdot \epsilon E = \rho$$

$$\nabla \cdot B = 0 \qquad \downarrow$$

$$\nabla^2 \phi = \frac{\rho}{\epsilon}.$$

Homogenous.

Green's fn :-

$$g(r, r') = \frac{1}{4\pi\epsilon_0} \frac{1}{|r - r'|}$$

Boundary condⁿ :-

$$n \times (E_2 - E_1) = 0 \longrightarrow n \times E_2 = 0 \rightarrow n \times E = 0$$

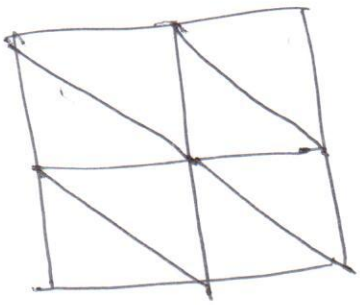
$$n \times (H_2 - H_1) = J_s \qquad \downarrow$$

equipotential surface.

$$n \cdot (D_2 - D_1) = \rho_s \longrightarrow \text{for dielectric (later)}$$

$$n \cdot (B_2 - B_1) = 0$$

Mesh:-



→ patchlist

n1 n2 n3

⋮

nodelist

x1 y1 z1

⋮

Why Δ?

MoM matrix ~~/~~ LHS / RHS

$Z x = b$

→ charge density on Δ

voltage on triangle.

→ MoM matrix

$$Z(i,j) = \int_{S_j} g(r_{c_i}, r') \, f(r') \, ds_j$$

Analytic integration.

7 pt. integration.

1 pt integration.

LU solver :-

Capacitance matrix

$$Q = CV$$

$$\begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ \\ q_n \end{bmatrix} = \begin{bmatrix} c_{11} & & c_{1n} \\ & \ddots & \\ c_{n1} & & c_{nn} \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ \\ \\ V_n \end{bmatrix}$$

$$c_{ij} = \sum_{n=1}^{\Delta_i} \sigma x_n \quad \text{for } V_{ij} = 1 \quad \& V_{ij} = 0$$