Hydrostatic stress tensor

Objective: To learn how to find the hydrostatic stress tensor at a given point.

Suppose at a point stress tensor $\sigma = \begin{bmatrix} \sigma_x & \tau_{xy} & \tau_{xz} \\ \tau_{xy} & \sigma_y & \tau_{yz} \\ \tau_{xz} & \tau_{yz} & \sigma_z \end{bmatrix}$

Evaluate $\bar{\sigma} = \frac{\sigma_x+\sigma_y+\sigma_z}{3}$

Hydrostatic stress tensor

$$\sigma_{Hyd} = \begin{bmatrix} \bar{\sigma} & 0 & 0 \\ 0 & \bar{\sigma} & 0 \\ 0 & 0 & \bar{\sigma} \end{bmatrix}$$

- **Physical significance of hydrostatic stress tensor**:
  Hydrostatic stress tensor is responsible for volumetric change in infinitesimal at point P. It doesn't change with stress transformation.