Imperial College London

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PhD week 22-Fisher information

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Information/observation sources:

Soil parameter θ is concerned

- X: moment from $\mathcal{M}_X(\theta)$
- Y: displacement $M_Y(\theta)$
- Z: pore pressure $M_Z(\theta)$

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Fisher information equation

Let us just look at displacement Y

$$I_Y(\theta) = \mathbb{E}\left[\left(\sum_i \frac{\partial}{\partial\theta}\log f(Y_i;\theta)\right)\left(\sum_j \frac{\partial}{\partial\theta}\log f(Y_j;\theta)\right)^T |\theta\right] \tag{1}$$

$$Y = \theta + w; \quad w \sim \mathcal{N}(0, \sigma^2) \tag{2}$$

Fisher information

$$f(y;\theta) = \frac{1}{(2\pi)^{1/2}\sigma} \exp\left(-\frac{(y-\theta)^2}{2\sigma}\right) \tag{3}$$

$$I_Y(\theta) = \mathbb{E}\left[\frac{(y-\theta)^2}{2\sigma}\right] = \frac{1}{\sigma^2} \tag{4}$$