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Spatial variability characterization and modeling of mechanical properties of tropical wood

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Goals & Context

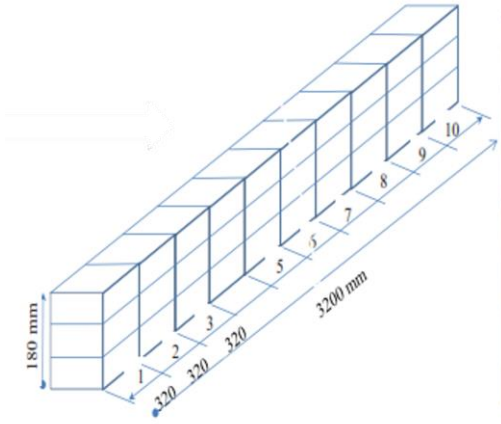
GOAL

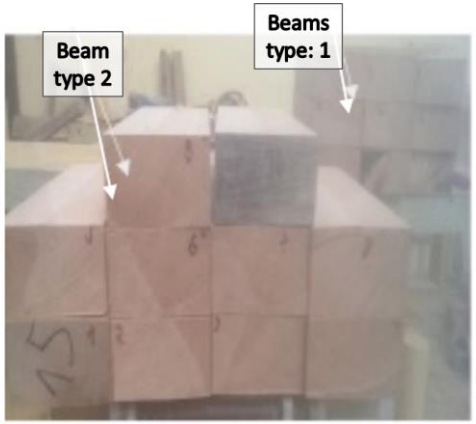
- Characterization and modeling of the spatial variability of mechanical properties of tropical wood, more specifically of the Moabi specie.

CONTEXT

- Research about this subject is a real challenge.

- Tropical wood is intensively used by the construction industry.





Approach

DATA ORGANIZATION & FILTERING

CHARACTERIZATION OF RANDOM FIELDS

- Standardization of R.V.

$$Z = \frac{X - \mu}{\sigma}$$

- Calculation of the Autocorrelation function

$$\rho(\Delta x) = \exp\left(\frac{-|\Delta x|}{b}\right)$$

MODELING SPATIAL VARIABILITY

- Karhunen-Loeve expansion

$$X(x,\theta) = \mu_X + \sigma_X \sum_{i=1}^{n} \sqrt{\lambda_i}\xi_i f_i(x)$$