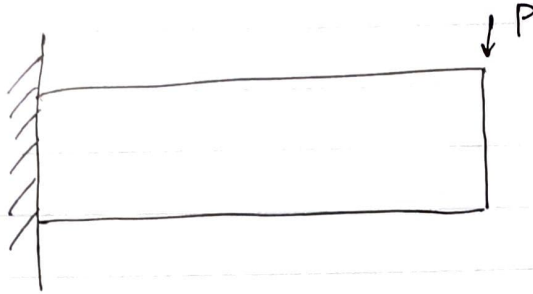


2nd AssignmentDeterministic and Stochastic FEM

$$\nu = 0.3$$

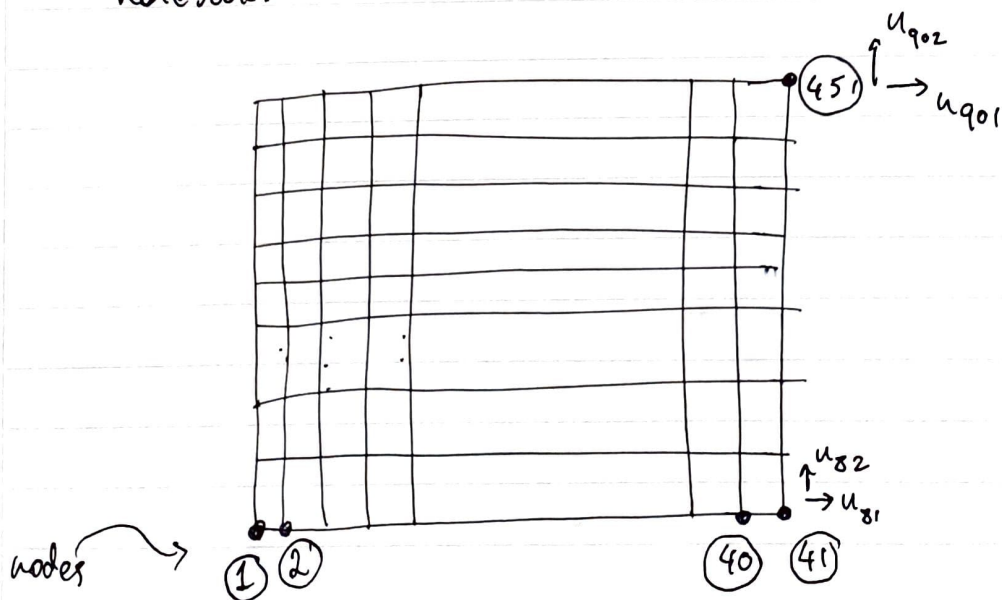
$$t = 0.2$$

$$P \sim N(\mu=10, \sigma=2) \text{ [kN]}$$

$$\text{and } E(x) = 10^5 (1 + 0.1 f(x)) \text{ [kN/m}^2\text{]}$$

with $f(x)$ a zero-mean, stationary Gaussian field with unit variance.

1. We develop the FE code shown in the Mathematica notebook.



We have $(40+1) \times (10 \times 1) = 451$ nodes.

The elements are squares $0.1 \text{ m} \times 0.1 \text{ m}$.

Hence, $a_{\text{elem}} = b_{\text{elem}} = 0.05$

2. We generate realizations of $E(x)$. From the autocorrelation function of f we have :
 $b = 3$, the correlation length, and
 from $x \in [0, 4]$ we have : $a = 2$.

Then, we generate the realizations of $f(x)$ and using $E(x) = 10^5 (1 + 0.10 f(x))$ we generate realizations of $E(x)$.

Then, we perform Monte Carlo simulations, each one with a realization of $E(x)$ and a different value of P from $N(\mu=10, \sigma=2)$.

The calculations and the histogram of u is shown in the Mathematica notebook.

3. The empirical pdf is shown in the notebook.