EXPLORATION PLATFORM LAGUN

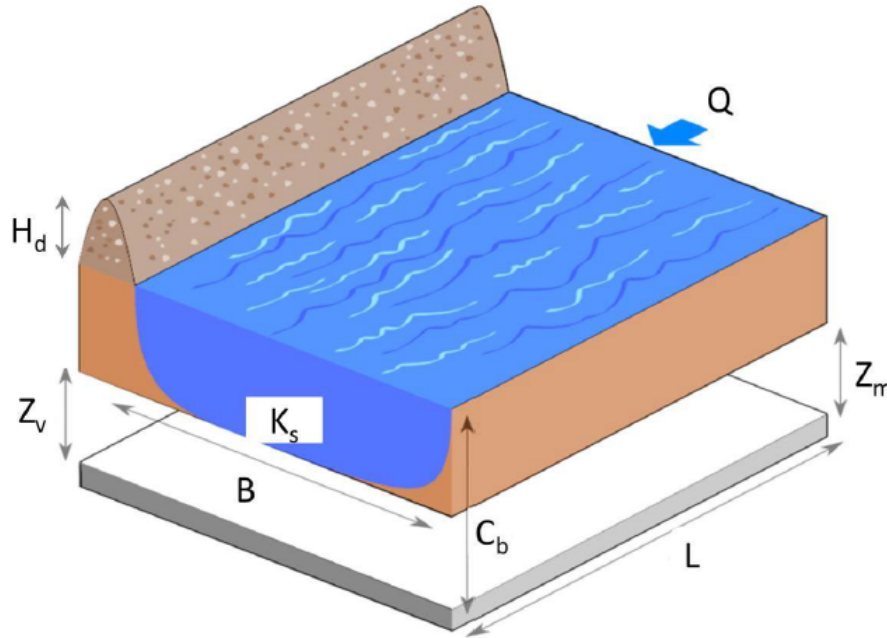# TEST CASE 3
SENSITIVITY ANALYSIS

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Test case presentation

Flood model

> The goal here is to protect an area subject to flood by building a dike. We consider the following simplied hydraulic model:

Q	River flow rate
K_s	Stricker coefficient
Z_v	Height of the upstream river bottom
Z_m	Height of the downstream river bottom
H_d	Dike height
C_b	Height of the river bank
L	Length of the river part under study
B	Width of the river part under study

Test case presentation

Flood model

> The goal here is to protect an area subject to flood by building a dike. We consider the following simplied hydraulic model:
>   - We focus on the overflow S (in meters), that is the difference between the river height and the dike height
>   - We are also interested in the annual maintenance cost of the dike C_{digue} (in million euros)

$$S = Z_v + H - H_d - C_b \ \text{ avec } \ H = \left(\frac{Q}{BK_s\sqrt{\frac{Z_m - Z_v}{L}}} \right)^{0.6}$$

$$C_{digue} = \mathbf{1}_{S>0} + \left[0.2 + 0.8 \left(1 - \exp\left(-\frac{1000}{S^4} \right) \right) \right] \mathbf{1}_{S\leq0} + \frac{1}{20} \left(H_d \mathbf{1}_{H_d>8} + 81 \mathbf{1}_{H_d\leq8} \right)$$

Test case presentation

Flood model

> We assume that the input parameters have the following probability distributions

Variable	Distribution type	Parameters
Q	Lognormal	$\mu = 4.22$, $\sigma = 2.44$
K_s	Gaussian	$\mu = 30$, $\sigma = 5$
Z_v	Gaussian	$\mu = 50$, $\sigma = 0.3$
Z_m	Gaussian	$\mu = 55$, $\sigma = 0.3$
H_d	Uniform	min = 5, max = 7
C_b	Gaussian	$\mu = 55.5$, $\sigma = 0.15$
L	Gaussian	$\mu = 5000$, $\sigma = 3$
B	Gaussian	$\mu = 300$, $\sigma = 1.5$

Objectives

Sensitivity analysis

Etapes :

1. Upload the given DOE and build a surrogate model. Check its accuracy.
2. Start by studying the sensitivity of each output with the default setting, i.e. uniform distributions for all input variables. Compare in praticular the influence on each output.
3. Define the uncertainties in a text file or inside the interface following the probability distributions defined previously.
4. Perform a new sensitivity analysis and compare with the previous results.