

Probabilistic slope stability analysis



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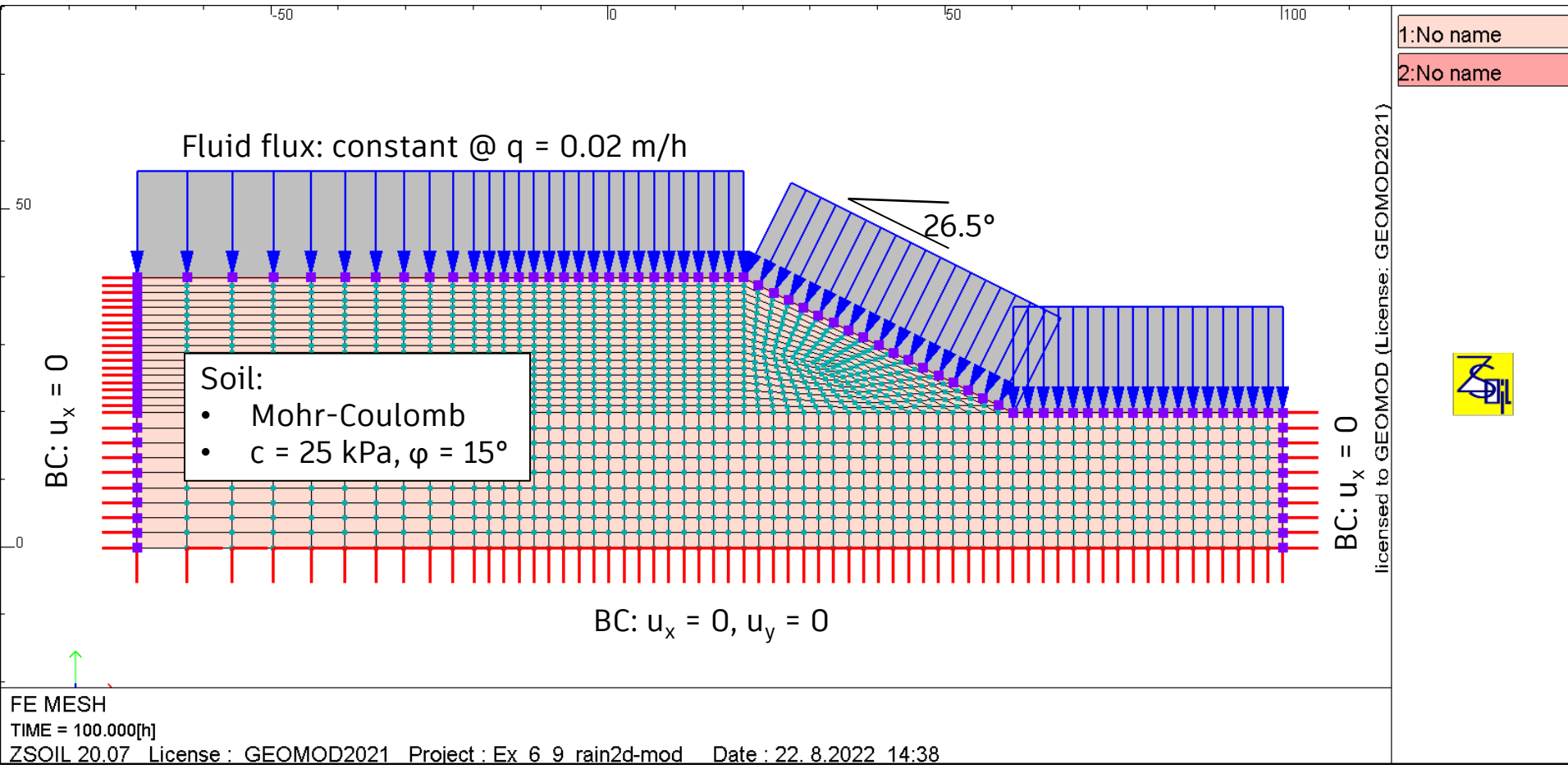
2022

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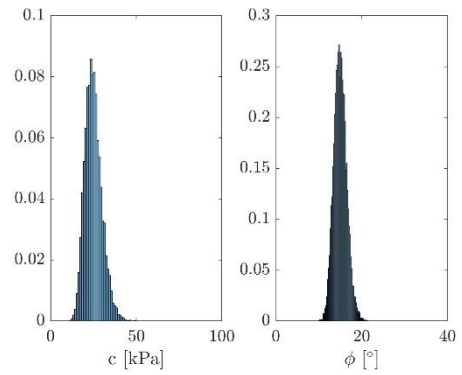
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Model description

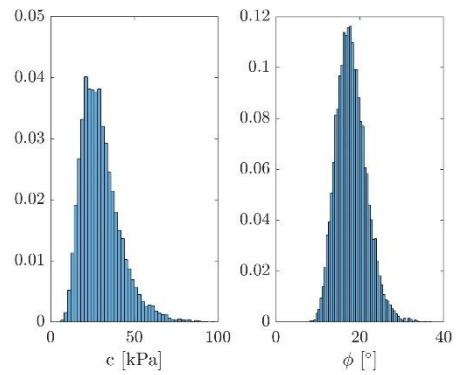
- Consolidation driver



Random variables



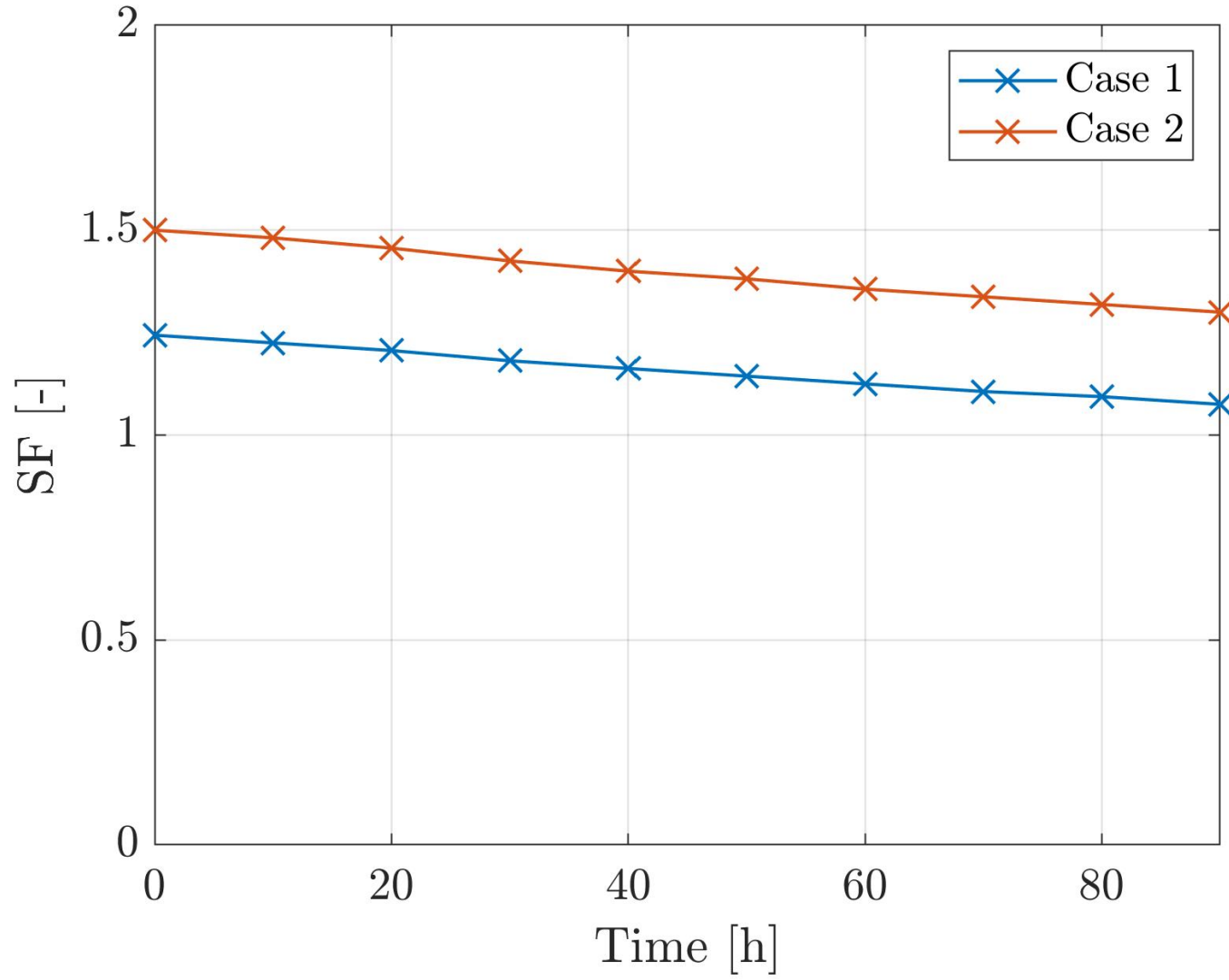
Case	Variable	Description	Distribution	Moments
1	c	Cohesion	Lognormal	25 kPa, COV = 20%
	ϕ	Friction angle	Lognormal	15°, COV = 10%



Case	Variable	Description	Distribution	Moments
2	c	Cohesion	Lognormal	30 kPa, COV = 60%
	ϕ	Friction angle	Lognormal	18°, COV = 30%

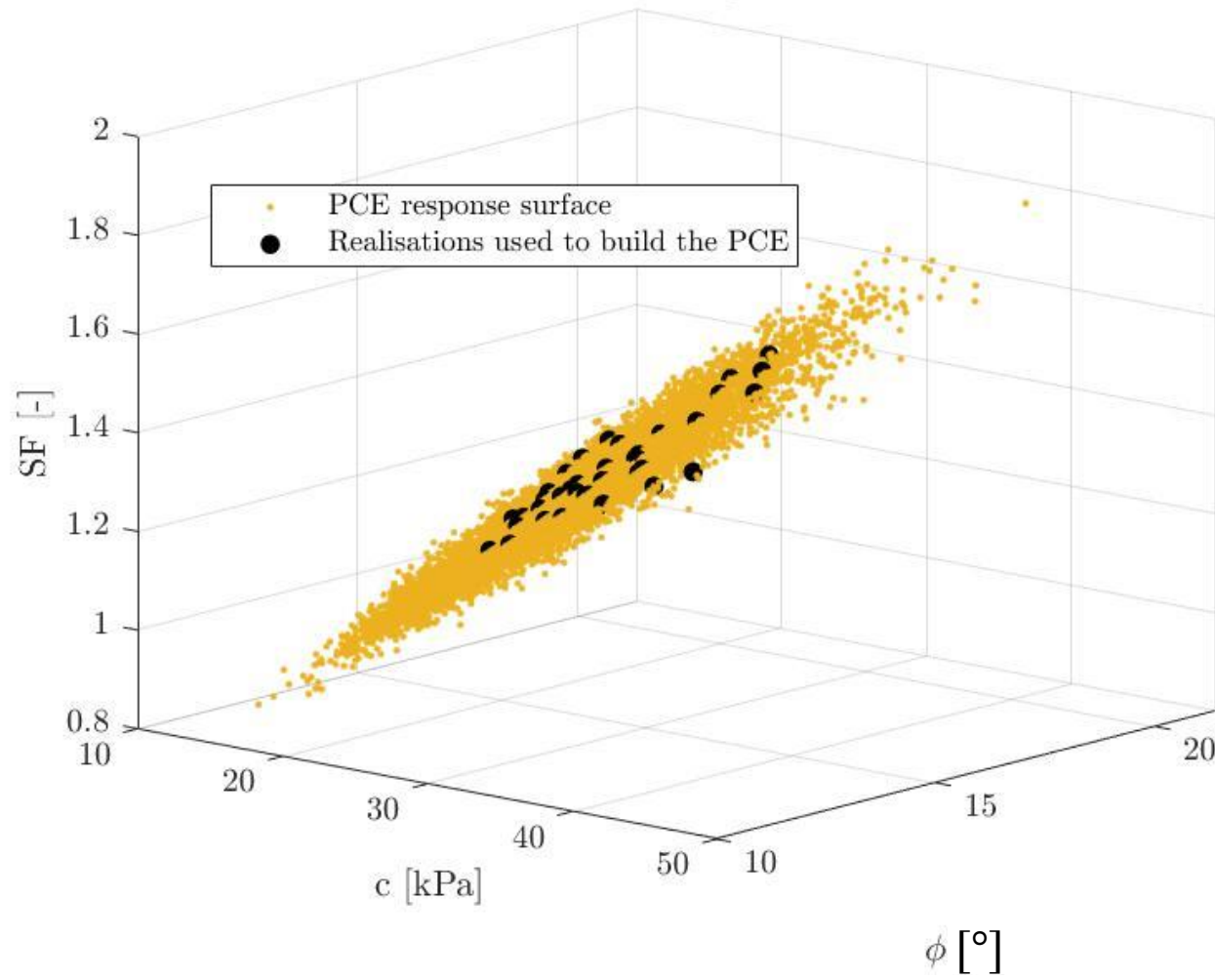
Deterministic analysis: safety factor (SF) over time

- With the mean values of the random variables



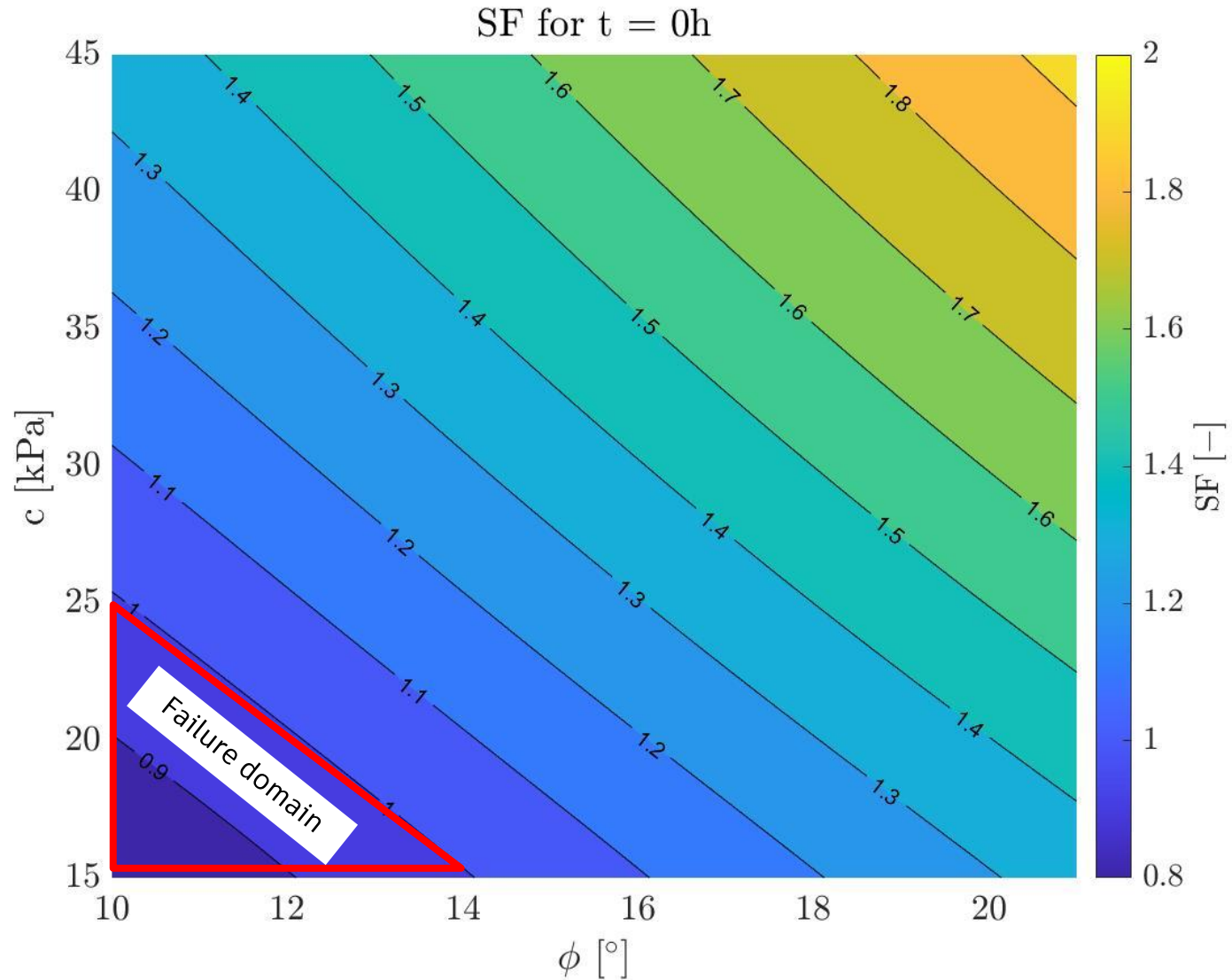
Polynomial Chaos Expansion (PCE)

- Approximates the ZSOIL response and is built on 50 ZSOIL realisations (black points)



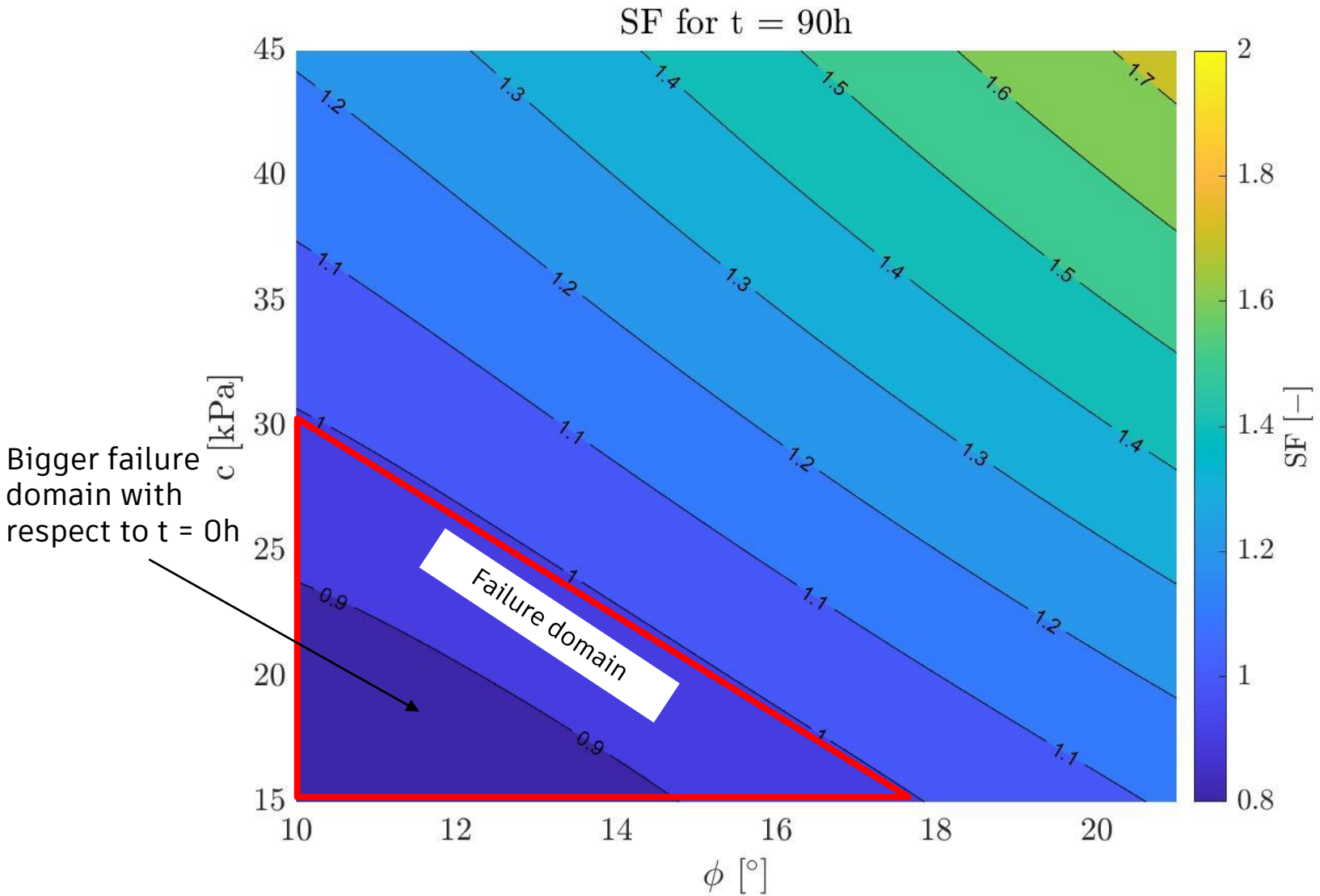
Probabilistic analysis of case 1

- 1'000'000 realisations evaluated with the PCE of the ZSOIL response for $t = 0h$



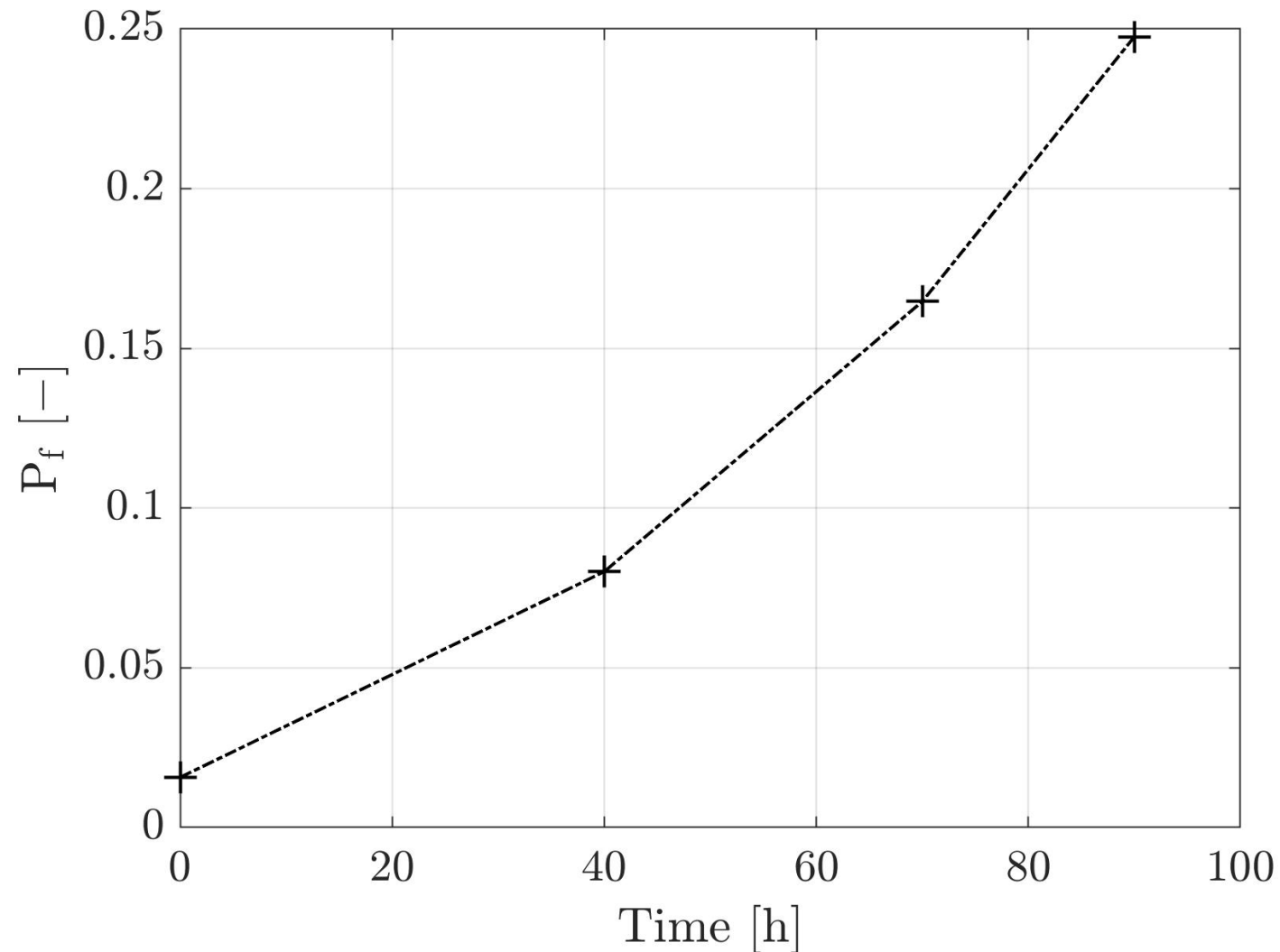
Probabilistic analysis of case 1

- 1'000'000 realisations evaluated with the PCE of the ZSOIL response for $t = 90h$

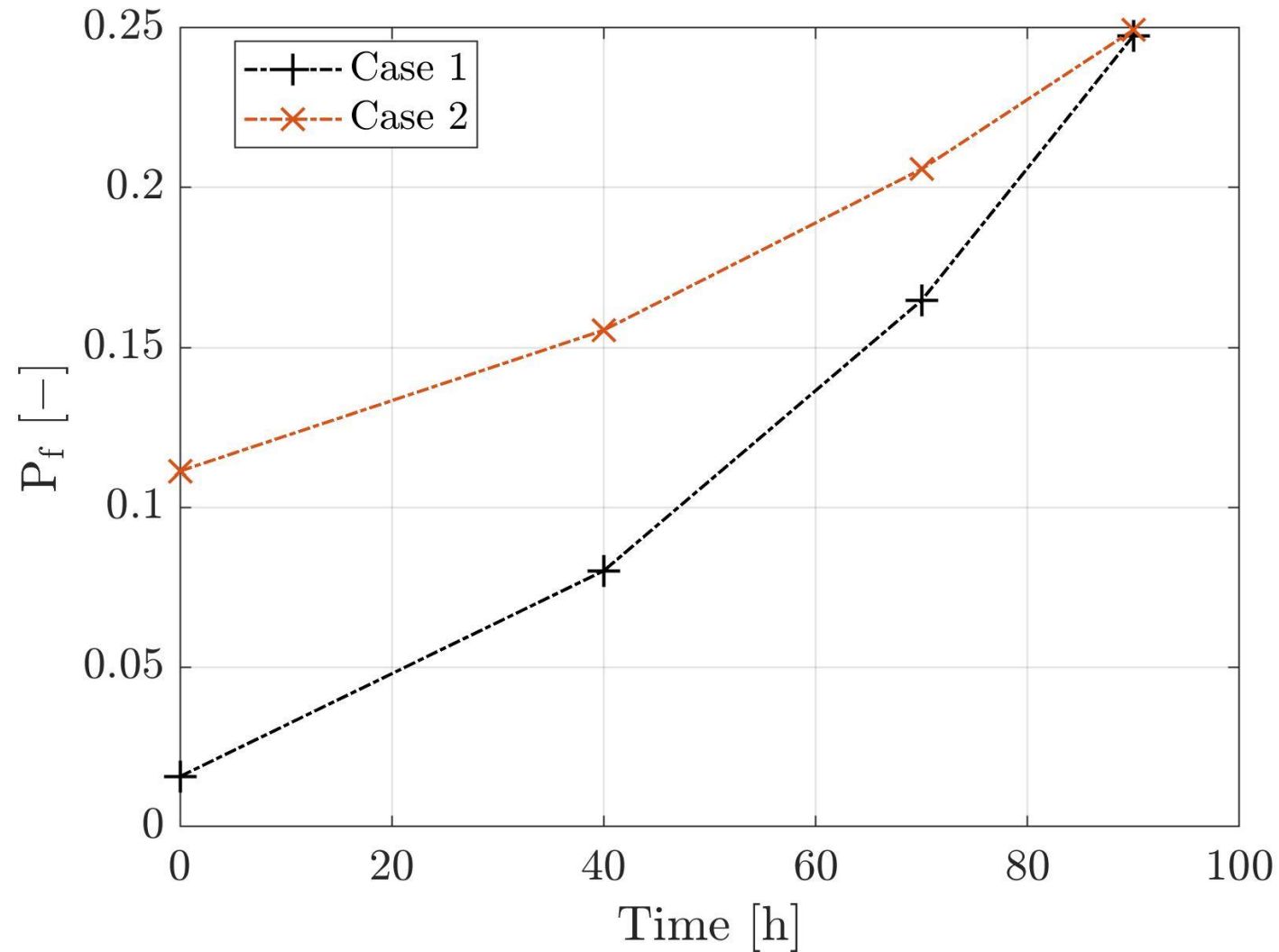


Probabilistic analysis of case 1

- P_f computed with the Monte-Carlo method over 1'000'000 realisations and using the PCE



Comparison between case 1 and case 2



Comparison between case 1 and case 2

