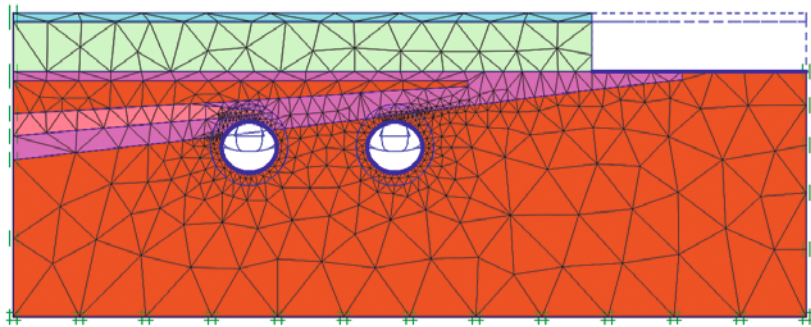# Seminar: Application of Non-probabilistic and Probabilistic Concepts in Finite Element Analysis of Tunnelling

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01.04.2011 − Part I − 11:00 ~ 12:30 h − IA 6/21
Part II − 14:00 ~ 17:30 h − IA 0/50

To deal with uncertainties in geotechnical problems, non-probabilistic or imprecise probability methods developed in the last two decades are applications in tunneling practice. One non-probabilistic method that can be combined with numerical methods without modifications of the numerical simulation code is investigated. It is demonstrated how this can be used for more rational engineering judgments and decision making in tunnelling. Among non-probabilistic methods, the Random Set Finite Element Method (RS-FEM) is feasible for practical geotechnical problems.

The merits and limitations of the RS-FEM are discussed and demonstrated by means of a real case study and the capabilities to consider uncertainties in the selection of material models are demonstrated by the means of two random set analyses are presented that employ the Hoek-Brown and the Mohr-Coulomb constitutive model. Discrepancies between the results are discussed and compared to the measurements. Afterwards, the results obtained from different random set analyses are combined using evidence aggregation methods. The Point Estimate Method - as one of the probabilistic approaches - and the RS-FEM are compared using the same case study. It is shown that similar results regarding the range of the most probable behaviour of a tunnel problem can be obtained from both PEM and RS-FEM approaches. At last, an exercise is given in which the RS-FEM procedure is applied for a simple tunnel example.

Guests are sincerely welcome!

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