MINI SYMPOSIUM
organized under the auspices of the IASSAR umbrella committee

ENGINEERING ANALYSES WITH
VAGUE AND IMPRECISE INFORMATION

Michael Beer[a], Ioannis Kougioumtzoglou[a], Edoardo Patelli[a], Kok-Kwang Phoon[b]
and Vladik Kreinovich[c]

[a] Institute for Risk & Uncertainty, University of Liverpool, Liverpool, UK
mbeer@liverpool.ac.uk; kougioum@liverpool.ac.uk; epatelli@liverpool.ac.uk

[b] Department of Civil and Environmental Engineering, National University of Singapore,
Singapore
kkphoon@nus.edu.sg

[c] Computer Science Department, University of Texas, El Paso, TX, USA
vladik@utep.edu

ABSTRACT

Engineering problems typically involve nondeterministic information in various forms and of various nature. Uncertainty and imprecision of this information may considerably influence the results of an analysis and associated decisions. This poses a challenge for a suitable mathematical modeling and an efficient analysis. Significant research is devoted, in particular, to problematic cases, which involve, for example, limited information, human factors, subjectivity and experience, linguistic assessments, imprecise measurements, dubious information, unclear physics, etc. In this context, probabilistic, non-probabilistic as well as mixed concepts of imprecise probabilities have been developed and applied successfully. Depending on the available information and depending on the purpose of the analysis these concepts possess useful features, which are complementary rather than contradictory to one another. In addition, considerable advancements in numerical efficiency have significantly increased their practical applicability in the recent past. Interval and fuzzy concepts as well as concepts of imprecise probabilities have achieved a new level of acceptance.

This mini-symposium aims at bundling the most recent developments of theories, concepts, methods and techniques for a proper numerical treatment of vague and imprecise information in the context of challenging geotechnical and structural engineering problems. Contributions may have a mathematical, a computer science or engineering nature. The models and strategies may include traditional statistics and probability theory, robust statistics, Bayesian theory, imprecise probabilities with its various branches such as evidence theory or fuzzy probability theory, interval analysis, fuzzy set theory, information gap theory, etc. The issues of numerical efficiency and applicability to industry-size problems are of particular interest.