Imprecise probability

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Reliability and performance analyses of complex systems become increasingly complicated due to limited, vague and imprecise information. This problem has generated significant developments on generalized approaches for uncertainty quantification with the key question of how to model epistemic uncertainty. In many practical cases only ranges or bounds are available for some parameters so that set-theoretical descriptors provide an appropriate model. In combination with probabilistic information this leads to imprecise probabilities as the theme of this Mini Symposium. Whilst previous developments were heavily focused on modeling with often simple applications to demonstrate basic features, the approaches have more recently reached a stage of sophistication that enables the solution of real-size problems. This step has been achieved by combining imprecise probabilities with established and emerging concepts and techniques from the traditional probabilistic field, specifically, with advanced stochastic modeling and Monte Carlo simulation. In view of model capabilities and numerical efficiency, concepts and technologies from mathematics and computer science have been adopted to meet the engineering requirements.

This mini-symposium aims at bundling the most recent developments in the area of imprecise probabilities, including strategies for bounding probabilities, in the context of challenging geotechnical and structural engineering problems. Contributions may have a mathematical, a computer science or engineering nature. The models may include all variants of imprecise probabilities such as interval probabilities, p-box approach, evidence theory, fuzzy probabilities and so forth. The issues of numerical efficiency and applicability to industry-size problems are of particular interest.