

Xiang Li, Xibing Li, Zilong Zhou, Yonghua Su and Wengui Cao, 2021, A non-probabilistic information-gap approach to rock tunnel reliability assessment under severe uncertainty, *Computers and Geotechnics*, 132 (1-2): 103940. DOI: 10.1016/j.compgeo.2020.103940.

Abstract This paper presents an information-gap approach (IGA) from a non-probabilistic viewpoint to perform rock tunnel reliability assessment when encountering one particular form of severely deficient information on the variability for the uncertain parameters of rock properties. Such a particular form of severe uncertainty corresponds to the circumstances, where there is nothing available to describe an uncertain rock parameter other than a nominal estimate, with upper and lower error bounds on either side of that estimate unknown. First, a typical rock tunnel example is selected to summarize its deterministic stability modelling. Later, the underlying principles regarding the IGA are elucidated, which involves two key issues. One pertains to the information-gap model built to quantify uncertainty arising from a severe lack of information, and the other is associated with the robustness function constructed to assess reliability in non-probabilistic terms. Further, a step by step procedure in applying the developed IGA in a rock tunnel engineering context is described, and then its applications are illustrated at length with the chosen typical rock tunnel example. This established non-probabilistic IGA, which aims to address rock tunnel reliability problems having severe uncertainty, could be viewed as a potential supplement to the traditional probabilistic method.

Keywords Rock tunnel stability, Severe uncertainty, Reliability, Non-probabilistic analysis, Information-gap, Robustness function.