Abstract   This work aims at proposing a methodology to analyze the robustness of reliability analysis under epistemic uncertainty. Motivated by a real industrial problem, the main contribution relies on the coupling of the info-gap framework with advanced failure probability estimators for robustness evaluations on the reliability assessment of penstocks. In order to improve the induced optimization searches, three original adapted line sampling procedures are proposed in order to address the complex limit-state function on which the failure probability depends. The proposed algorithms are proven to be well suited for the search of the multiple roots involved in the line sampling technique. Then, a classification and a regression artificial neural network are combined for predicting the roots in an aleatory and epistemic augmented space in order to reduce the computational time engendered by robustness evaluations.

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