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DEVELOPMENT OF A DECISION SUPPORT SYSTEM BASED ON STOCHASTIC NONLINEAR OPTIMIZATION FOR PETROLEUM-CONTAMINATED SITE MANAGEMENT

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Abstract

In this study, a decision support system based on a stochastic optimization model under modeling uncertainty and parameter certainty (SOMUM-DSS) is developed for petroleum-contaminated sites management. The SOMUM-DSS incorporates scenario analysis, numerical simulation, multivariate analysis, nonlinear optimization within a decision support system. It provides an effective tool for decision makers to select the optimal remediation strategy. The developed SOMUM-DSS is then applied to a petroleum-contaminated aquifer located at the town of Kindersley in western Canada. A number of scenarios are initiated respectively corresponding to different levels of groundwater quality satisfying the environmental standard, as well as various durations of groundwater remediation. The results indicate that the environmental standard and remediation duration play an important role in determining the optimal remediation strategy. The successful real-world application of the SOMUM-DSS also indicates its potential of solving other groundwater remediation problems.

Key words: decision support system, groundwater remediation, modeling uncertainty, PAT, stochastic optimization model

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