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AN ENHANCED ENVIRONMENTAL MULTIMEDIA MODELLING SYSTEM (FEMMS): PART II – USER INTERFACE AND FIELD VALIDATION

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Abstract

Environmental quantitative risk assessment requires the development of multimedia modeling tools to address dynamic site conditions at field scale. This work is the second part in a two-part series. A new fuzzy-set enhanced environmental multimedia modeling system (FEMMS) has been presented in Part I. Environmental multimedia modeling often involves a sizeable amount of parameters and data. The challenges have been the difficulties to quantify the uncertainties and to manage the data and main modules. Besides the efforts of developing a new EMMS for useful functionality and engineering applicability, a user-friendly graphical user interface (GUI) has been developed in this research for the FEMMS to provide support for the processing of model input and output as well as to facilitate technology transfer. To assess the developed FEMMS and its user interface system with real case application, a larger scale application with field data is conducted to examine the performance of FEMMS in this study. The field-scale validation presented in this paper indicates that the developed FEMMS is able to (1) predict the time and space varying chemical concentrations in a multimedia environment involving air, soil, and groundwater; (2) characterize the potential risk to human health presented by contaminants released from a contaminated site; and (3) quantify the uncertainties associated with modelling systems and subsequently providing robustness and flexibility for the remediation-related decision making. It also shows that, with the aid of fuzzy-set approach and the developed GUI, FEMMS is a reliable decision making tool to address complex environmental multimedia pollution problems and to provide technical support to strategy makers in managing the contaminated environmental sites.

Key words: fuzzy-set, landfill, multimedia modeling, risk assessment, user interface, validation

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