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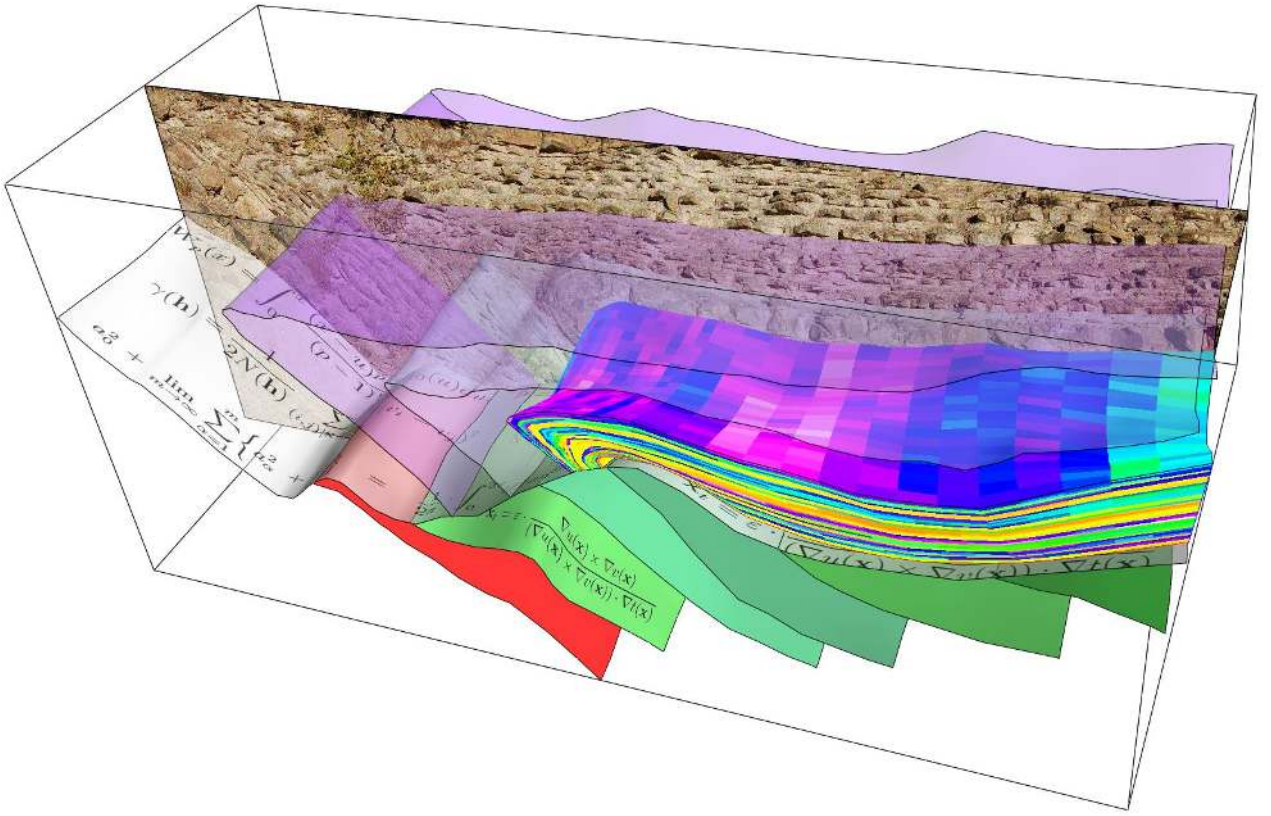
Abstracts



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S0202. Identification of groundwater contaminant source characteristics through artificial neural network

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The needs of the modern man have given rise to economies based on intensive agriculture and industrial production in which water is both a resource and a waste product. Limited water resources address the problem of its sustainable use and without causing environmental consequences or groundwater pollution. In this sense is essential to have a tool that can reduce the computational burden of a numerical model, preserving the reliability of the results. Artificial Intelligence, and in particular neural networks, can be employed in this context as data-driven surrogate models to solve forward and inverse problems.

In this work, a groundwater contaminant source reconstruction problem is investigated through feedforward artificial neural network (FFWD-ANN). Different cases have been analyzed and the Latin Hypercube Sampling has been used to randomly generate the training dataset. Firstly, the release history at two contaminant sources with known location has been used as input data to train the network for solving a forward transport model. In the process, the ANN is able to well estimate the pollutant concentrations in 7 monitoring wells, at different times. Then, the surrogate model has been trained to deal with inverse transport problem related to different application cases: 1. estimation of the release history at one contaminant source with known location; 2. simultaneous estimation of the release history and location of one contaminant source; 3. estimation of the release history at two contaminant sources with known location; 4. simultaneous estimation of the release history and error on observations. The obtained results, compared with literature data, show that neural networks represent an efficient approach in contaminant source reconstruction problems.