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REPRESENTATION OF MULTIPLE HYDROSTRATIGRAPHIC REGIONS FOR GROUNDWATER MANAGEMENT PROBLEMS SUBJECT TO UNCERTAINTY IN THE HYDRAULIC CONDUCTIVITY

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Summary. It is well known that the uncertainties in hydrologic modeling are an obstacle for developing truly optimal groundwater management solutions. Including uncertainties in optimal groundwater management problems is a large focus of research. Different types of uncertainty have been shown to have a significant effect on the accuracy of groundwater flow modeling. Two types of uncertainty that have been the focus of research are the uncertainty due to spatial variability of hydraulic conductivity and the uncertainty in the locations of the boundaries of hydrostratigraphic regions within the bounds of a groundwater model. In this research these two types of uncertainty are simultaneously included in the development of an efficient groundwater management system. An algorithm is developed that distinguishes between the smooth variances in spatially variable fields and the sharp distinctions between multiple hydrostratigraphic units. This algorithm invokes Kriging to randomly generate spatially correlated hydraulic conductivity fields dependent upon discrete hydrologic data. The boundaries of distinct hydrostratigraphic regions are then identified by using image processing techniques. Algorithms are developed that utilize spatial averaging techniques, segmentation techniques and contour algorithms while placing limits on geometric parameters that are observed in geologic settings. Realizations of hydraulic conductivity fields are generated and used to develop management solutions.