Verification and Validation of an Optimal-Groundwater-Development Model for Coastal Areas

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A simulation-optimization model is developed to determine optimal well operation rates for extraction of freshwater and saltwater, and for injection of freshwater in coastal areas. Saltwater pumping and freshwater injection may be used to control intruding saltwater wedge. The finite-element simulation model is based on the sharp-interface flow model and the optimization technique is based on a genetic algorithm. The flow model can simulate both freshwater flow and saltwater flow. An objective function is formulated so that the optimization model can address not only for optimal extraction rates and locations but also for optimal control of intruding saltwater wedge. For the latter either freshwater injection or saltwater extraction can be considered. Impacts on groundwater environment are also accounted for. The proposed optimization model provides a versatile and comprehensive tool in developing and managing coastal groundwater. In this presentation results of verification and validation study of the simulation and optimization model are to be presented.