

SOFTWARE REVIEW

Groundwater Modeling System (GMS) 6.0

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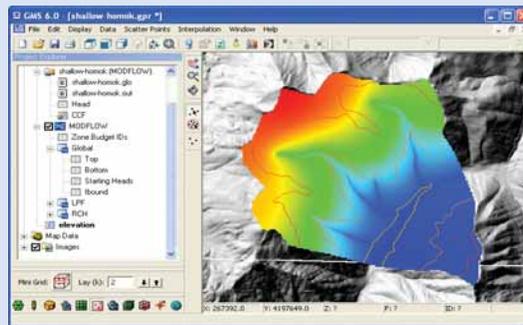
Groundwater Modeling System (GMS) is a comprehensive software package for building and running groundwater flow and contaminant transport models. The Environmental Modeling Research Laboratory at Brigham Young University in Utah oversees the continued development of GMS (currently at version 6.0), but GMS is distributed commercially through many vendors.

GMS provides tools for site characterization, model development, post-processing, calibration, and visualization. It supports triangular irregular networks (TINs), solids, borehole data, 2-D and 3-D geostatistics, and both finite-element and finite-difference models in 2-D and 3-D, including MODFLOW, MODPATH, MT3D, RT3D, FEMWATER, SEEP2D, ART3D, MODAEM, SEAM3D, and UTCHEM. Parameter estimation is supported through the processes included with MODFLOW-2000, PEST, and UCODE.

GMS allows the user to select modules in custom combinations to perform such operations as pre- and post-processing, model selection, and calibration routines. Discussion of all modules is beyond the scope of this review, but websites of commercial vendors contain detailed descriptions and applications of each one (search the Internet for “GMS 6.0”). New users can select specific modules for a current project and add more as their needs expand or change. Although the initial learning curve is steep, use of GMS ultimately saves time by providing a “package” of modeling modules that is the same for a variety of programs.

GMS uses the same conceptual model approach for all models, which is built into the map/GIS module. Here, a user defines model properties (such as boundary

Review of Groundwater Modeling System 6.0



Ease of Use: 
GUI: 
Output/Plotting: 
Documentation: 
Speed: 
OVERALL RATING: 

Rating System:
Excellent 
Poor 

Application
Groundwater flow and contaminant transport

Best Features
Link with ArcGIS and conceptual model development

Worst Feature
Graphics associated with inversion routines

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conditions, hydraulic conductivity values, 2-D and 3-D model domains) in a GIS interface that is independent of the simulation codes. With the click of a mouse, model properties are transferred from the GIS interface to the appropriate grid cells or mesh elements, allowing one to quickly change a conceptual model, transfer these conditions to a new simulation, and evaluate the results. More advanced users can easily see and edit the grid-by-grid values without going to the final text file (although a quick check of the text files is always a good idea). GMS 6.0 can be fully integrated with ArcGIS (if the user has an ArcGIS license), providing a seamless transfer from creating conceptual models to producing final figures of results.

Although GMS has excellent modular, visualization, and conceptual model development capabilities, its complexity can be a disadvantage. Early versions of upgrades have contained bugs in some new features, particularly related to the ArcGIS and other graphical interfaces. These eventually were worked out in revised releases.

In summary, GMS 6.0 is a useful multipurpose groundwater modeling package that offers the advantages of modular purchases, multiple model support, linkages to ArcGIS, conceptual model development, and integrated inversion routines. As with many software

programs, new releases should be used with the understanding that some of the latest features may require revision before the full range of capabilities are functional.

Basic GMS packages start at about \$1,650 and are available through the EMRL at www.emrl.byu.edu and at commercial sites. Mention of trade names does not imply any endorsement by the author or the USGS.

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