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A new paradigm for groundwater modeling. (English) [Zbl 1323.76086](#)

Cai, Xing (ed.) et al., Quantitative information fusion for hydrological sciences. Berlin: Springer (ISBN 978-3-540-75383-4/hbk). Studies in Computational Intelligence 79, 19-41 (2008).

From the summary: We present a new computing paradigm and a novel, sophisticated computational environment that enables fully taking advantage of today's computing power, especially the computer of the future, and allows, for the first time, real-time 3D groundwater modeling. The new environment, called Interactive Ground Water (IGW), utilizes a powerful "parallel computing", "dynamic visualization", and "computational steering" methodology, restructuring and integrating the entire modeling process. This environment enables seamless, dynamic data routing and fusion of flow modeling, transport modeling, subscale modeling, uncertainty modeling, geostatistical simulation, GIS mapping, and 3D visualization. IGW functions as an intelligent "numerical research laboratory" in which a modeler can freely explore: visually creating aquifers of desired configurations, interactively applying stresses, and then investigating on the fly the geology, dynamic flow and transport in three space dimensions. At any time, a modeler can edit, monitor and interact with virtually any aspects of the integrated modeling process; the modeler can initiate, pause, or resume particle tracking, plume modeling, multi-scale modeling, stochastic modeling, and analyses. IGW dynamically merges geospatial data, modeling inputs and outputs, and stratigraphic and sampling network information into composite 2D and 3D graphical images – providing a more complete view of the complex interplay among the geology, hydrology, and transport. The capabilities of real-time simulation, analysis, steering, and presentation expand the utility of groundwater modeling as a tool for research, education, professional investigation, and integrated management decision support.

For the entire collection see [\[Zbl 1137.76004\]](#).

MSC:

- [76M35](#) Stochastic analysis applied to problems in fluid mechanics
- [76M27](#) Visualization algorithms applied to problems in fluid mechanics
- [86A05](#) Hydrology, hydrography, oceanography

Software:

[CUMULVS](#); [GSLIB](#); [SCIRun](#); [VTK](#); [volsh](#)

Full Text: [DOI](#)

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