Software accelerates groundwater simulations

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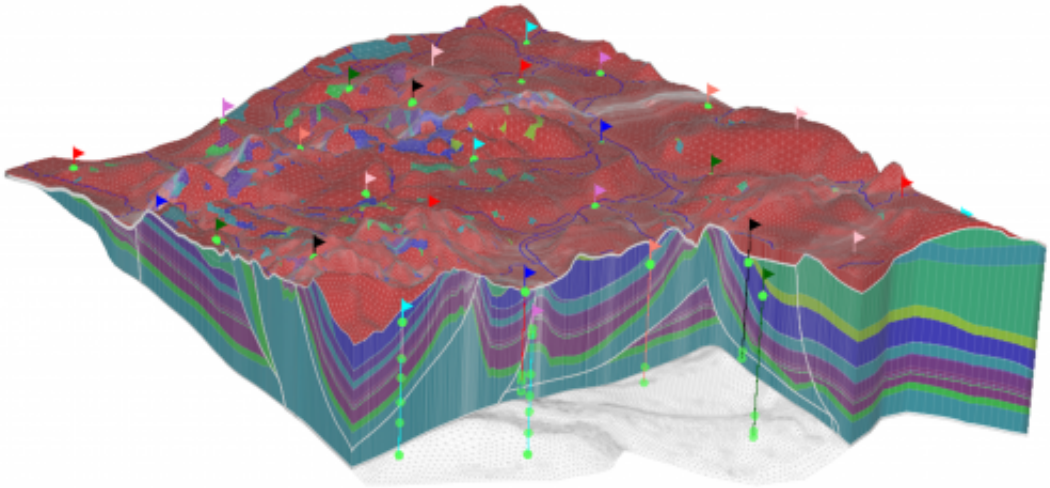

Finite element groundwater model. Credit: DHI-WASY

Leading global companies like Schlumberger Water Services, Aquaveo LLC, DHI Water & Environment, Environmental Simulations Inc., and HydroGeoLogic Inc. exploit Fraunhofer SCAI's linear solver library SAMG (Algebraic Multigrid Methods for Systems) for the acceleration of their groundwater simulation software. Groundwater models are the basis for computer simulations for a range of industrial and environmental research themes, such as analyses of pump testing, the diffusion of toxic elements, and the prediction of changes in groundwater levels. The computationally most intensive process during a groundwater simulation is the solution of the extremely large linear

systems of equations.

By using the industry-leading library SAMG, computing times can be reduced enormously. SCAI's software allows the user to increase modeling accuracy and at the same time keep compute times manageable. Furthermore, SAMG handles strongly heterogeneous systems like hydraulic conductivity systems where standard solvers fail. SAMG is available for use with the MODFLOW-software from the United States Geological Survey (USGS) and visitors to the MODFLOW & More conference to be held in Golden, Colorado in the first week of June will have a chance to find out more about the software.

SAMG is a library of subroutines for the highly efficient solution of large, sparse linear systems of equations. Such systems of equations form the numerical kernel of most simulation software packages. Usually, the numerical solution of these linear systems of equations needs most of the computational time of the whole simulation. SAMG supports both serial and multi-core computations on single PC, workstation or compute nodes.

The work of Fraunhofer SCAI is dedicated to partners and customers involved in software development and applications. In addition to the solver technology, SCAI offers analysis and advice on application problems as well as tailoring of the software to the customers' computer systems, in particular for parallel computers.

Provided by Fraunhofer Institute for Algorithms and Scientific Computing

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