

New Technology in Reservoir Simulation

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This talk will address some developments of scanning, grid generation, discretization methods, linear solvers, solution techniques, and visualization in numerical reservoir simulation in my research group in the Center. The scanning technology scans and extracts various geometrical data such as depth, thickness, porosity, permeability, and the location of wells, fractures, and faults. From scanning, the gridding technology generates corresponding 2D or 3D unstructured meshes. New discretization methods over these meshes have been developed. These methods are based on control volume methods, are capable to handle faults and slanted wells, and apply to arbitrarily shaped control volumes. The linear solvers are based on parallel preconditioned Krylov subspace methods. The solution techniques consist of iterative IMPES, sequential, and fully implicit schemes. Visualization tools possess real-time calculation and real-time display capabilities and provides streamline computations. Parallel computing technology will be presented. As model examples in reservoirs, black-oil, compositional, and thermal flow models will be discussed.