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SPEAKER/ABSTRACT

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"Parameter Subset Selection for Coupled Flow and Deformation Modeling"

Abstract:
Many subsurface reservoirs compact or subside due to production-induced pressure changes. Numerical simulation of this compaction process is important for predicting and preventing well-failure in deforming hydrocarbon reservoirs. However, development of sophisticated numerical simulators for coupled fluid flow and mechanical deformation modeling requires a considerable manpower investment. This development time can be shortened by loosely coupling pre-existing flow and deformation codes via an interface. Pressure changes after set of flow time steps can be used to load mechanical deformation. The mechanics code then solves for displacement and strain. Changes in strain can lead to porosity changes which are then sent back to the flow simulator for the next set of time steps. Loose two-way coupling even for a simple flow and deformation model leads to interesting questions regarding development of coupled emulators. Parameter subset selection can be used to determine influential parameters for the coupled simulator which may lead to fast reduced-order models or emulators.