Numerical Analysis and Scientific Computing Seminar

Multigrid Reduction for Multiphase Flow and Mixed-Precision Solvers

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Abstract: Simulation of flow in porous media, such as reservoir geomechanics, involves solving multi-physics problems in which multiphase flow is tightly coupled with geomechanical processes. To capture this dynamic interplay, fully implicit methods, also known as monolithic approaches, are usually preferred. However, due to the strong coupling present in the continuous problem, efficient techniques such as algebraic multigrid (AMG) cannot be directly applied to the resulting discrete linear systems. This talk will present our efforts in developing an algebraic framework based on multigrid reduction (MGR) that is suited for tightly coupled systems of PDEs. I will demonstrate the applicability of the MGR framework to multiphase flow coupled with geomechanics and show that the framework is flexible to accommodate a wide range of scenarios, as well as efficient and scalable for large problems. ¡br¿¡br¿Time permitting, I will also discuss some of our recent efforts in utilizing mixed-precision strategies for numerical solvers, including multigrid solvers.

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https://emory.zoom.us/j/95900585494

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