Semi-explicit discretization of poroelastic equations
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In this talk, we discuss the time discretization of poroelasticity, a coupled elliptic-parabolic PDE. Fully implicit methods exhibit inefficiency due to the high dimensionality of the coupled problem. As such, we consider a semi-explicit approach, meaning that the mechanics and the flow equations are solved sequentially. In contrast to classical iterative methods such as the well-known fixed-stress scheme, no relaxation parameter or inner iteration is needed. On the other hand, the semi-explicit approach restricts the class of possible applications due to stability issues. To overcome this problem, we present a novel time integration approach which combines the iterative idea with the semi-explicit Euler approach. For this, we are able to prove first-order convergence for an a priori specified number of inner iteration steps, only depending on the coupling strength.

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