



Universität Stuttgart

Kolloquium des Fachbereichs Mathematik und dem Stuttgart Center for Simulation Science (SimTech)

Es spricht am **Montag, 25. April 2022 um 16:00 Uhr**

Herr Dr. Benjamin Unger (SimTech)

zum Thema: **“Decoupling time-discretization schemes for poroelasticity”**

Abstract: Biot's consolidation model for poroelasticity is used as a mathematical model to simulate the deformation of a porous material saturated by a fluid and has diverse applications ranging from geophysical understanding to tumor modeling. From a mathematical point of view, the system consists of an elliptic PDE that is coupled with a parabolic equation. Due to the (operator) differential-algebraic character of the coupled system, explicit time-discretization schemes cannot be used, rendering this a computationally challenging problem. In this talk, we propose a novel semi-explicit time-discretization scheme that decouples the porous media flow and the mechanical problem with guaranteed convergence order if a weak coupling condition is satisfied. The convergence analysis is based on an interpretation of the semi-explicit scheme as an implicit scheme for a related time-delay equation. Using the theory of delay differential equations, we are able to explicitly quantify the weak coupling condition and illustrate that such a condition is, in fact, necessary for convergence. We close this talk by explaining how this idea can be extended to schemes with higher convergence order.

Der Vortrag findet in Präsenz im Fakultätssaal 8.122 statt und wird online per Webex übertragen.

<https://unistuttgart.webex.com/unistuttgart-en/j.php?MTID=m6d53c1147c6c07c24f630cd25511103f>

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