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ON THE PERFORMANCE OF ISOGEOMETRIC APPROXIMATIONS FOR THE DISCRETIZATION OF POROMECHANICAL MEDIA

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Isogeometric Analysis (IGA) improves the compatibility between Computer-Aided-Design (CAD) and Finite Element Analysis (FEA) by using the same approximation functions for the geometry and the field variables. An additional advantage of IGA is the *smoothness* of the approximating functions, which in general entails higher rates of convergence in comparison with traditional FEA.

In this contribution we study the suitability of IGA to discretize the soil consolidation problem, which is governed by the Biot model for poromechanical continua. Consolidation problems typically entail the appearance of sharp gradients of the involved variables, inadequate approximation of which can lead to incorrect transient behavior which consequently affects the reliability of the steady-state solution. Earlier studies have revealed that IGA can be more accurate than traditional FEA for this class of problems. However, the exploration of the performance of IGA for media with more challenging (and realistic) parameters is still open to deeper analysis. Here we want to further explore the potential of IGA for this class of problems by studying the performance of various mixed IGA element families.

The availability of benchmark results for simplified test cases makes it possible to study the accuracy of IGA in detail. The analysis considered here focuses on the evaluation of the solution on specific locations as well as across critical lines inside the domain. The accuracy in the pore excess pressure and the displacement field will be evaluated for a wide range of physical parameters. This benchmark study is a first step for further exploration of the performance on more complex problems, such as the hydraulic fracture problem in porous media.

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