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TITOLO:
Virtual Element Approximation For Poroelasticity Problems

ABSTRACT:
In these years, the applications of the Virtual Element Method (VEM) to computational mechanics have met many successes, both for its robustness in treating general polygonal and polyhedral meshes, including hanging nodes and non-convex elements, and for its great flexibility in handling some features of the problems. In particular, for elasticity problems, whose variational formulation is based on the Hellinger-Reissner principle, the Virtual Element approach turned out to be a valid alternative to the classical Galerkin methods, for instance, Finite Elements, providing stable 2D/3D schemes which preserve the symmetry of the stress tensor, the continuity of the tractions and they are reasonable cheap with respect to the delivered accuracy. Recently, exploiting these features of VEM, we focus our attention on the application of this technology to the quasi-static Biot's consolidation problem describing Darcian flow in a deformable saturated porous medium. The idea is to design a VE method for the four-field formulation, where the symmetry of the stress field is strongly imposed in the discrete space.

In this talk, we present a low-order virtual element method for these poroelasticity problems. Some numerical tests are provided to show the validity and the potential of the proposed method.

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