Tuesday the 14 May 2019 at 15:00
Politecnico di Torino, Aula 13A

Michele STARNONI

Researcher at University of Bergen

Semi-local modelling and discretization of flow and mechanics in porous media with thin inclusions

Prof. Stefano Berrone introduces the seminar

Abstract

We are interested in subsurface engineering applications concerning three-dimensional porous media with thin inclusions. Examples of objects that can be modelled as embedded thin layers in subsurface porous media include faults, fractures, and saline aquifers.

In the first part of the talk, Dr Starnoni will present an improved framework for modelling flow and elasticity in porous media with thin inclusions, within the context of mixed-dimensional partial differential equations (md-PDEs). This improved framework is based on a novel "semi-local" approach, which consists on the partition of both the tangential stress/flux and tractions/normal fluxes into two terms, namely in-plane gradients and out-of-plane "half-jumps". After that, the discussion will be limited to flow only. To this end, an improved mortar-based approach to modelling and discretizing flow in porous media with thin inclusions will be introduced, which is termed the semi-local mixed-dimensional flux coupling (SLMDFC) scheme. This formulation is to be interpreted as a generalization of the mixed-dimensional flux coupling scheme presented in Nordbotten et al. (2018). Extension to elasticity follows naturally but is not addressed here. Finally, in the last part of the talk, a consistent discretization of the additional "half-jump" terms arising in our formulation is presented, together with numerical examples showing its convergence properties.

1 J. M. Nordbotten, W. M. Boon, A. Fumagalli, E. Keilegavlen, *Unified approach to discretization of flow in fractured porous media.* Computational Geosciences, 2018.

Biography

Michele Starnoni is currently research fellow at the Department of Mathematics of the University of Bergen, Norway. He obtained his PhD in Engineering in 2017 from the University of Aberdeen, UK. He received his Master degree in Civil Engineering from University of Padova, in 2011.

Save the date for the next event: May 20, 2019
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