

数学与系统科学研究院
计算数学所网络学术报告

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报告题目:

**Hybridized finite elements methods
applied to hydro-mechanical
problems**

邀请人: 张晨松 副研究员

**报告时间: 2020 年 11 月 6 日 (周五)
上午 9:00-10:00**

报告工具: Zoom 会议 (ID: 938 3442 3855)

会议链接:

<https://psu.zoom.com.cn/j/93834423855>

Abstract:

New techniques and formulations related to hybrid finite elements are studied and applied in this work, motivated by relevant fluid and geomechanical problems in the context of recent demands of the Petroleum industry. A special focus is given to the multiscale hybrid-mixed (MHM) method, a numerical technique targeted to approximate systems of differential equations with strongly varying solutions. This is extended here to different flow problems, more specifically, Brinkman and Navier-Stokes equations. In this regard, a new hybrid formulation is proposed: the Stokes tensor is decomposed into tangential and normal tractions, adding conditions on faces driven by Lagrange multipliers on the tangential part. The analyzed methods allow the use of numerical techniques, such as static condensation, in order to obtain considerable improvements in performance. For incompressible fluids and $H(\text{div})$ -conforming formulation, this method naturally gives exact divergence-free velocity fields, with local conservation at any scale, leading to accurate results with a very reduced number of global equations; properties that few schemes can achieve. All the methods are implemented using an object-oriented computational environment.

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