Contribution ID: **212** Type: **Oral Presentation**

Efficient Solvers based on Hybrid High Order (HHO) methods for flow simulations in fractured rocks.

Thursday, 2 June 2022 11:35 (15 minutes)

In many subsurface applications (water resources, geothermal applications, oil/gas extraction, nuclear waste disposal), fractures play a major role as they are preferential flow paths. Fractures appear at all scales, from the centimeter to the kilometer. This wide range of scales spread over large computational domains requires efficient and robust numerical methods, capable of managing networks with millions of fractures. In this presentation, we investigate the computational performance of hybrid high-order methods [Di Pietro, et al., 2014; Cicuttin, et al., 2018] applied to flow simulations in extremely large discrete fracture networks (over one million of fractures). We study the choice of basis functions, the trade-off between increasing the polynomial order and refining the mesh, and how to take advantage of polygonal cells to reduce the number of degrees of freedom [Ern, et al., 2021].

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References

D. Di Pietro, A. Ern and S. Lemaire, An arbitrary-order and compact-stencil discretization of diffusion on general meshes based on local reconstruction operators, Comput. Methods Appl. Math., 14(4), 461-472, 2014.
M. Cicuttin, D. A. Di Pietro and A. Ern, Implementation of Discontinuous Skeletal methods on arbitrary-dimensional, polytopal meshes using generic programming, J. Comput. Appl. Math., 344, pp. 852–874, 2018.
Alexandre Ern, Florent Hédin, Géraldine Pichot, Nicolas Pignet. Hybrid high-order methods for flow simulations in extremely large discrete fracture networks, Preprint, https://hal.inria.fr/hal-03480570, 2021.

Time Block Preference

Time Block A (09:00-12:00 CET)

Participation

Unsure

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Presenter: PICHOT, Géraldine (Inria)

Session Classification: MS03

Track Classification: (MS03) Flow, transport and mechanics in fractured porous media