Contribution ID: **157** Type: **Oral Presentation**

Online Fast Flow simulations for Discrete Fractured Media with Non-Standard Reduced Basis Method

Tuesday, 1 June 2021 15:10 (15 minutes)

Reduced Basis (RB) methods are well-known and widely used techniques applied to complex parameterized simulation problems to obtain reliable discrete results for a particular choice of parameters, largely reducing the computational time to obtain the numerical solutions.
Flow simulations in underground fractured media seems to be a perfect application for the RB framework, due to the stochastic nature of the mechanic properties and the complex geometries of the domain obtained by random probability distributions.
Unfortunately, standard RB tools proved to be ineffective in the robust PDE-constrained optimization formulation proposes in [1], because of the use of non-conforming meshes for the computation of the underground flow on Discrete Fracture Network (DFN).
Thus, with the help of the residual-based a posteriori error available in [2], we propose an aggregated trial reduced space [3] reduced with an alternative RB greedy technique which requires no inf-sup lower bound estimation.
Numerical tests will be presented to show the ability of the technique to recover the right RB space dimension with a smart stopping criterion which relates the accuracy of RB approximation with the accuracy of the high fidelity solution.

Time Block Preference

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

References

[1] S. Berrone, A. Borio, and F. Vicini. Reliable a posteriori mesh adaptivity in discrete fracture network flow simulations. CMAME, 2019.
[2] S. Berrone, S. Scialò, and F. Vicini. Parallel meshing, discretization, and computation of flow in massive discrete fracture networks. SISC, 2019.
[3] F. Negri, G. Rozza, A. Manzoni, and A. Quarteroni. Reduced basis method for parametrized elliptic optimal control problems. SISC, 2013

Acceptance of Terms and Conditions

Click here to agree

Newsletter

Student Poster Award

Primary authors: VICINI, Fabio (Politecnico di Torino); BERRONE, Stefano (Politecnico di Torino, Italy)

Presenter: VICINI, Fabio (Politecnico di Torino)

Session Classification: MS3

Track Classification: (MS3) Flow, transport and mechanics in fractured porous media