Coupling Navier-Stokes and Darcy equations: an overlapping approach

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ABSTRACT

Interface Control Domain Decomposition (ICDD) is a novel method designed to address heterogeneous and multiphysics problems by overlapping subdomains splitting. Interface controls are unknown functions used as Dirichlet boundary data on the interfaces of an overlapping decomposition designed for solving boundary value problems. The controls are computed through an optimal control problem with interface observation ([1, 2]).

The main advantage of applying this approach to heterogeneous problems is to avoid sharp interfaces which would require an in depth knowledge of the local physical behavior (interface conditions) of the specific problem.
In this talk we consider the Navier-Stokes/Darcy problem modeling the filtration of incompressible fluids through porous media, aiming at discussing both theoretical and computational aspects of the ICDD method, as well as at comparing this approach with classic coupling techniques based on the Beavers-Joseph-Saffman interface conditions ([2]).

References

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