

THE ICDD METHOD TO MODEL THE FILTRATION OF FLUID IN POROUS MEDIA

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ABSTRACT. The talk focuses on the validation of the Interface Control Domain Decomposition (ICDD) method in the context of the Stokes-Darcy problem to model the filtration of fluids in porous media.

Differently from the commonly used approach that imposes the Beavers-Joseph-Saffman coupling conditions at a sharp interface between the fluid region and the porous medium, the ICDD method [1] considers an overlapping decomposition of the computational domain and it looks for local velocities and pressures such that the velocity and pressure jumps are minimized on interfaces internal to the fluid domain and to the porous medium domain, respectively.

To validate the ICDD method, its solution is compared with the one computed by solving the Stokes equations at the microscale. The analysis allows us to identify the best width of the overlapping region and its position inside the transition zone that separates the free-fluid regime from the porous-medium regime. Finally, in the case of homogeneous porous media, we show that the ICDD solution is an approximation of order ε of the Stokes solution at the microscale, where ε is the ratio between the micro and the macroscale.

REFERENCES

- [1] M. Discacciati, P. Gervasio, A. Giacomini, and A. Quarteroni. The interface control domain decomposition method for Stokes-Darcy coupling. *SIAM J. Numer. Anal.* (2014) **54**:1039–1068

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