Aurelio Spadotto

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Research Interests

Numerical analysis for partial differential equations, discretization methods based on polygonal/polytopal methods, computational modeling of moving interfaces, fluid-structure interaction.

Education

IMAG, Université de Montpellier — **Montpellier, France**
Ph.D. in Applied Mathematics — *2021-*
Thesis : "Numerical Simulation of Electrodeformation of Red Blood Cells"

Politecnico di Milano — **Milan, Italy**
Master of Science in Mathematical Engineering — *2019–2021*
Focus : Numerical Analysis of PDEs and Scientific Computing

Politecnico di Milano — **Milan, Italy**
Bachelor of Science in "Ingegneria Matematica" — *2016–2019*

Publications and Events

Preprint: D.A. Di Pietro, S. Mendez, A. Spadotto, "A discrete de Rham discretization of interface diffusion problems with application to the Leaky Dielectric Model", 2024

Conference: A.Spadotto, S.Mendez, "Immersed boundary simulations of red blood cells in blood analyzers : representation of Maxwell stress", *Journées Math Bio Santé 2024*, Nantes, 2024

Workshop: A.Spadotto, S.Mendez, P.Benard, "Electrodeformation of red blood cells, extension to 3D and improved accuracy at membrane", *Extreme-CFD Workshop, 7-th Ed.*, Merville-Franceville, 2024

Workshop: A.Spadotto, S.Mendez, "Ghost Fluid Method (GFM) for Electrodeformation", *Extreme-CFD Workshop, 6-th Ed.*, Merville-Franceville, 2023

Conference: A.Spadotto, S.Mendez, "Towards modeling of the electro-deformation for red blood cells flowing in Coulter counters", *Dynacaps 2023*, Compiègne, 2023

Software Projects

Yales2Bio (contributor): a HPC Fortran platform for CFD simulation of the interaction between blood and medical devices (detailed presentation and credits here). I was involved in the development of the module for the estimation of red blood cell deformation induced by electric fields present in blood analysis systems. In particular, I have been working on an implementation of the Ghost Fluid Method for the treatment of immersed interface conditions for the electrostatic potential coupled with an Immersed Boundary solver for the cell dynamics.

poly-memb (author): a 2D python library for the simulation of membrane dynamics relying on

new-generation numerical methods supporting polygonal meshes. In particular a Hybrid High Order scheme to treat flow variables and a Discrete De Rham scheme for electric variables (documentation here).

Professional Experience

Université de Montpellier, Faculté de Science **Montpellier, France**
Teaching Assistant *2022-*

- TD : Outils Mathématiques2 ; fall 2024
- TD : Outils Mathématiques 1 ; fall 2024, fall 2023
- TD : Méthodes Calculatories ; fall 2023, fall 2022

Technical Skills

Programming: Python, MATLAB, C++, Fortran

Tools: Git, LaTeX, Gmsh, ParaView, Jupyter Notebook

Languages

English: Fluent *Full professional proficiency*

French: Fluent *Full professional proficiency*

Italian: Fluent *Full professional proficiency*

References

Available upon request.