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Laboratoire Jacques-Louis Lions

Univerité Paris 6, projet REO

175, rue du Chevaleret

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**PhD Thesis in Applied Mathematics
Engineer of Ecole Centrale de Lyon****Research interests**

Modeling of physical phenomena, particularly fluid flow and transport in porous media, blood flow in human arteries, domain decomposition methods, multiscale models, inverse problems with the adjoint approach, code coupling and parallelism.

Education

2005 Post-doc at Paris 6 (Laboratoire J.-L. Lions) in the Reo project, under the direction of Marc Thiriet et Jean-Frédéric Gerbeau.

Subject : *Modeling of stent in blood flow as a resistive interface*. Funded on a contract with the company Cardiatis.

2004 Post-doc at the Politecnico di Milano (Italy), under the direction of A. Veneziani and L. Formaggia.

Subject : *Parameter estimations for a one-dimensionnal blood flow model in arteries*. European fellowship, HaeMModel project.

March 2004

Ph.D thesis in Applied Mathematics (University of Paris IX Dauphine), under the direction of J. Roberts, at INRIA Rocquencourt. ("félicitations du jury")

Subject : *Multidomain simulation of flow in porous media*.

Fellowship from ANDRA (French National Radioactive Waste Management Agency).

2000 Master's Degree (DEA) in Numerical Analysis at Lyon – St Etienne, mention Assez Bien.

Internship at INRIA Rocquencourt under the direction of J. Jaffré.

2000 Engineering diploma of **Ecole Centrale de Lyon** (engineering school). Major: Mathematics for modeling and computation.

1994-1997 Preparatory school at Lycée Saint Louis (Paris).

June 1994 Scientific high school diploma (Baccalauréat C), mention Assez Bien.

Publications

Articles:

Modeling fractures and barriers as interfaces for flow in porous media (with J. Jaffré and J. Roberts), SIAM J. on Scientific Computing, 26, No 5, pp. 1667--1691, 2005.

Proceedings:

Parameter identification for a one-dimensional blood flow model, with F. Clément, A. Decoene, J.-F. Gerbeau, ESAIM: Proc., September 2005, Vol. 14, pp. 174—200.

Décomposition de domaine et préconditionnement pour un modèle 3D en milieu poreux fracturé, with L. Amir, M. Kern, and J. Roberts (in French), Proc. of JANO 8, 8th conference on Numerical Analysis and Optimization, December 2005, Rabat, Morocco.

Décomposition de domaine pour un milieu poreux fracturé, with L. Amir, M. Kern, V. Martin, and J. Roberts (in French), Proceedings of TAM-TAM'05, 2nd conference on Trends in Applied Mathematics in Tunisia, Algeria, Morocco, April 2005, Tunis. *Actes du 2ème Colloque sur les Tendances des Applications Mathématiques en Tunisie, Algérie, Maroc*, 2005, N. Gmati, M. Jaoua, M. Moakher Edts, pp. 295-300.

Domain decomposition and functional programming with OcamlP3l, with F. Clément, A. Vodicka, R. Di Cosmo and P. Weis, Proc. of the ECCOMAS Conference on Coupled Problems, May 2005, Santorini Island, Greece.

Domain decomposition for flow simulation around a waste disposal site: direct simulation versus code coupling using OcamlP3l (with F. Clément, A. Vodicka, R. Di Cosmo and P. Weis), Proceeding of the Intern. Conf. on Supercomputing in Nuclear Appl. (SNA'2003, Paris, France).

Generalized cell-centered finite volume method for flow in porous media with fault (with J. Jaffré and J. Roberts), Proc. of Finite Volume for Complex Appl. 3 (FVCA3, Porquerolles, France), R. Herbin and D. Kroner Eds, 2002, pp. 357-364.

Submitted

Impact of a stent on the blood flow in a terminal aneurism: modeling with (Navier)Stokes equations and a Darcy interface, with M. Fernandez, J.-F. Gerbeau.

Other publications

Ph.D. Thesis : *Multidomain simulation of flow in porous media*.

Parallel programming with the OcamlP3l system, with applications to coupling numerical codes (with F. Clément, A. Vodicka, R. Di Cosmo, Zheng Li and P. Weis), RR-Inria no 5131.

Study of the application of the method of fictitious domains to a model of porous medium with a fault: Master's thesis (DEA).

Conference presentations

- Nov. 2004 Presented *Parameter estimation for 1D blood flow model*, at the INDAM workshop on the Integration of Complex Systems in Biomedicine: Models, Simulations, Representations (Bergamo, Italy). (INDAM is the Italian National Institute for High Mathematics).
- June 2004 Presented *Multidomain simulations of flow in porous media* at the Mox seminar (Milano, Italy).
- Nov. 2003 Presented *Parallel domain decomposition with OcamlP3L: a local refinement method*, at the MoMaS scientific days (Luminy, France). (MoMaS is a group of research on Mathematical modelling and numerical simulations for problems linked to radioactive waste management.)
- Sept. 2003 Presentation in *SNA'2003* (see publication above).
- March 2003 Presented *Numerical modeling of flow in porous media with faults* at the 7th SIAM Conf. on Math. and Comput. Issues in the Geosciences (GS03, Austin, Texas).
- Dec. 2003 Presented *Numerical modeling of flow in porous media with faults* at the MoMaS seminar (France).
- June 2002 Presentation at *FVCA 3* (see publication above).
- June 2002 Presented *Multidomain simulation for the storage of nuclear wastes* at ANDRA's day of Ph.D students (Paris, France).
- June 2001 Presented "Flow and transport of contaminants in a porous medium with faults" at the 5th SIAM Conf. on Math. and Comput. Issues in the Geosciences (GS01, Boulder, Colorado).

Summer schools

- Aug. 2004 Project for HaeMOdel project at the Cemracs summer school (Centre d'Été Mathématique de Recherche Avancée en Calcul Scientifique. CIRM, Luminy, France) on the parameter estimation of blood flow.
- June 2003 Numerical analysis summer school organized by CEA-EDF-INRIA: Adaptive methods for conservation laws. Lectures by B. Cockburn and J. Flaherty.
- Aug. 2001 Project for ANDRA at the Cemracs on the multiscale problems: nonconforming domain decomposition for the simulation around a nuclear waste disposal site (joint work with S. Wagner under the supervision of F. Nataf and Y. Achdou).

Aug. 2000 Project for the CEA (French Atomic Energy Commission) at the Cemracs summer school on flow in a porous media with faults.

Teaching experience

Mar-Jun. 06 Teaching assistant in mathematics at Ecoles des Mines de Paris: *integration, measure, Fourier transform* (3rd year course).

Mar-Jun. 03 Idem.

Mar-Jun. 02 Idem.

Oct 01-Jan 02

Teaching assistant in mathematics at University of Paris IX Dauphine: *functions of 2 variables, optimisation* (1st year course).

Feb-Jun. 01 Teaching assistant in mathematics at University of Versailles: *functions of several variables, parametric curves, Euclidian spaces* (2nd year course).

Other experience

Jun-Aug. 99

Internship at SNCF (French national railway company), Paris. Numerical studies of air flow in the TGV coach. Validation of a software (Flovent).

Jul. 98 : Internship at La Poste (French Mail office), Paris. Postman.

Languages

Programming : **C++**, **OCaml** (see <http://www.ocaml.org>).

LifeV: contribution to the development of the finite element code: **LifeV** (see <http://www.lifev.org> and <http://cmcsforge.epfl.ch/projects/lifev/>)

Parallel code coupling with **OcamlP3l** (see <http://www.pps.jussieu.fr/~dicosmo/ResearchThemes/PARA/OCAMLP3L/qui.di.unipi.it/index.html>).

Software: Matlab, Excel, Flovent (air flow, using finite volumes).

French: mother tongue.

Italian: fluent

Spanish: beginner.

English: fluent (TOEFL: 593).

Russian: intermediate.