Ing. Petr Hotmar, M.Sc., Ph.D.

Université Paul Sabatier
Laboratoire Plasma et Conversion d'Energie
118, rte de Narbonne
31062 TOULOUSE cedex 9, France

Phone (work):   +33 5 34 32 24 03
Fax (work):   +33 5 61 55 64 52
Email: hotmar@laplace.univ-tlse.fr
Homepage: http://eng.fsu.edu/~hotmape

Work Experience

Postdoctoral Fellow in Computational Plasma Physics, LAPLACE (Plasma and Energy Conversion National Laboratory), France, 2013–2016:

- Principal research in BATIR (deposition dynamics in dielectric barrier discharge) and EXFIDIS (extreme-field nano-second streamer discharge) projects
- Developed simulation software (C++/Fortran) to model streamers in extreme electric field and deposition in DBD plasma, with supporting Comsol/Matlab framework
- Proposed a novel design for DBD reactor and nozzle injector for Coating Plasma Industrie
- Developed a Direct simulation Monte Carlo code for pressure-driven orifice flow
- Set up and administered an HPC Linux cluster (CentOS)
- Set up an in-house web portal and database (LAMP) to interface research results

Research and Teaching Assistant, Chemical and Biomedical Engineering, FSU (Florida State University), USA, 2006–2012:

- Made contributions to the theory of fundamental solutions of Stokes equation
- Developed an extensive software framework for mesoscale simulation of polyelectrolyte dynamics in confinement
- Made contributions to the phase-space kinetic theory of polymer solutions
- Developed a hybrid method for Langevin dynamics of polymer translocation
- Optimized a prototype device for dielectrophoretic separation of microparticles
- Conducted research in Molecular Modeling, Microfluidics, Transport Phenomena and Applied PDE Theory
- Taught Process Design and Analysis (principal instructor), Chemical Engineering Computations and Unit Operations Lab

Research and Teaching Assistant, Computing and Control Engineering, VSCHT Praha (Prague University of Chemistry and Technology), Czech Republic, 2002–2004:

- Developed a fuzzy control module for traffic lights
- Proposed a Lyapunov-based stabilization scheme for a magnetic levitation model
- Conducted research in Machine Learning, Nonlinear Systems Control and Digital Signal/Image Processing
- Taught Scientific Computing (principal instructor)

English Teacher, Translator and Interpreter, 1998-2006: Skrivanek s.r.o., James Cook Languages s.r.o., Prague School of Hotel Administration s.r.o., Tutor s.r.o.

Biochemical Laboratory Assistant, Na Homolce Hospital, 1996

Education

Ph.D. Chemical and Biomedical Engineering, Florida State University, USA, 2013

M.Sc. Chemical and Biomedical Engineering, Florida State University, USA, 2010

Ing. (M.Sc.) Computing and Control Engineering, Prague Institute of Chemical Technology, Czech Republic, 2002

Selected Affiliations, Involvement and Awards

Golden Key International Honour Society, Member (GPA: 4.0), 2007–2011

Certificate in Instructional Excellence, Florida State University, 2007

English Language Certificates: GRE (verbal 710, 97th percentile), TOEFL (290, computer-based), Advanced Language Skills (University of Chicago), 2005 and 1999

Multiple Awards in Undergraduate and Graduate Research Competitions (Prague Institute of Chemical Technology, Florida State University)

Certificate in Mathematical Modeling of Technological Processes, Technical University of Kosice, 2001

Skills

Languages

Czech (native), English (proficient), French (proficient), Russian (prior exposure)

Software and Hardware

Extensive experience with scientific computing, computer programming, Linux and HPC administration. Advanced knowledge of networking technologies, cybersecurity and virtualization.

Operating systems: Unix and Linux (system administration), MS-Windows (advanced user)

Programming languages: C++, Fortran, scripting (bash, perl, python, php)

Development libraries and tools: MPI, OpenMP, Overture, Boost, Eigen, Git, Doxygen, Gdb

Applications: MySQL, Maui/Torque, Matlab/Simulink, Comsol, Mathematica, Aspen

Hardware: high-performance servers (HP, Supermicro), experience with digital electronics and circuit design

Appendices

Selected Presentations

Numerical Analysis of Runaway Electron Preionized Diffuse Discharge, Université Paris Sud, France, 2015

CFD Design of Tubular Showerhead, Coating Plasma Industrie, France, 2014

Transport of Chemical Species in Rolling-Web PECVD Reactor, PROMES, France, 2014

Mesoscale Treatment of Hydrodynamic Interactions in Complex Fluids, Florida State University, USA, 2009

Lagrangian Particle Tracking Interfaced with Molecular Dynamics, Florida State University, USA, 2008

Dielectrophoretic Separation of Microparticles and Nanoparticles, Florida State University, USA, 2008

Electroosmotic Transport in Microchannels, Florida State University, USA, 2007

Selected Publications and Conference Proceedings

Research on alternative positioning navigation and timing in Europe *Integrated Communications, Navigation, Surveillance Conference (ICNS), 2018*

The Impact of Electron Energy on Streamer Propagation in Extreme Electric Field, *in draft*

Modeling Streamer Propagation in Extreme Electric Field on Structured, Composite Grids, *in draft*

DBD Reactor Design and Optimization in Continuous AP-PECVD from HMDSO/N_2/N_2O Mixture, *Eur. Phys. J. Appl. Phys., 2016*

An Axisymmetric Unstructured Finite Volume Method Applied to the Numerical Modeling of an Atmospheric Pressure Gas Discharge, *Journal of Computational Physics, 2015*

Memory Effects and the Origin of Seed Electrons in Atmospheric DBD Plasma, *LAPLACE report, 2015*

CFD Design and Study of an AP-PECVD Injection Nozzle, *LAPLACE report, 2014*

DSMC Code for Pressure-Driven Orifice Flow, *LAPLACE report, 2013*

Green's Function for Stokes Flow in a Rectangular Channel, *to be submitted*

Brownian Dynamics of Polymer Migration in Combined Pressure-driven and Electrophoretic Flows, *submitted*

Kinetic Theory of a Charged FENE Dumbell in Confined Flow Under Applied Pressure and Electric Fields, *submitted*

A Hybrid Molecular Dynamics Study of the Translocation of DNA Through Entropic Traps, *63rd Annual Meeting of the American Physical Society Division of Fluid Dynamics, 2010*

Robust Filtering of NMR Images, *Prague Matlab Conference Proceedings, 2003*

Stabilization and Control of Non-Linear Dynamic Systems: Magnetic Levitation Model, *Prague Matlab Conference Proceedings, 2003*

Fuzzy Control of Traffic Lights, *Prague Matlab Conference Proceedings, 2002*