Jonathan Viquerat

INRIA Research Engineer
PhD in applied mathematics

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Professional experience

2018 – Present	**Research engineer**, *CEMEF Mines ParisTech, (Sophia Antipolis, France)*, CFL team, Topic : Machine learning for CFD problems. Reference : Elie Hachem, elie.hachem@mines-paristech.fr, +33 4 93 95 74 58
2015 – 2018	**Research engineer**, *INRIA, (Sophia Antipolis, France)*, Nachos project-team, Topic : Development of a discontinuous Galerkin solver suite for nano-optics problems. Reference : Stéphane Lanteri, stephane.lanteri@inria.fr, +33 4 92 38 77 34
2012 – 2015	**PhD in applied mathematics and numerical simulation**, *INRIA, (Sophia Antipolis, France)*, Nachos project-team, Topic : Discontinuous Galerkin time-domain method for nanophotonics. Reference : see above
2012	**Master's degree internship (2nd year)**, *INRIA, (Sophia Antipolis, France)*, Nachos project-team, Topic : Discontinuous Galerkin time-domain method for nanophotonics. Reference : see above
2011	**Master's degree internship (1st year)**, *University College, (London, UK)*, Mechanical engineering department, Topic : Assessment of transcatheter aortic valve devices by numerical simulation on commercial solver. Reference : Gaetano Burriesci, g.burriesci@ucl.ac.uk, +44 20 7679 3922

Developments

Diogenes A discontinuous Galerkin solver suite for nano-optics applications, written in modern Fortran. This project included several tasks, such as :

- ◇ A parallel time-domain discontinuous Galerkin (DGTD) solver for Maxwell's equations, including standard and advanced features (TF/SF injector, PMLs, complex sources and material laws, oblique incidence with PBC, mixed polynomial orders, ...),
- ◇ A mesh processing library, able to handle mixed element meshes (hexa/tetra) and curvilinear cells,
- ◇ A mesh partitioning tool (based on Metis) for such meshes,
- ◇ A material processing tool, to fit material parameters on experimental data,
- ◇ A post-processing tool for solution visualization,
- ◇ The coupling with optimization libraries,
- ◇ The computation of a large set of real-life problems, set up in collaboration with academic (CNRS LPMC (Nice), Institut Pascal (Clermont-Ferrand), Bristol University, C2N (Saclay)) and industrial (CEA LETI (Grenoble), SunPartner (Aix)) partners,
- ◇ Maintenance on a parallel frequency-domain hybrid discontinuous Galerkin (HDGFD) solver,
- ◇ A website (see `https://diogenes.inria.fr/`).

Studies

2009 – 2012	**Engineering degree in applied mathematics**, *ENSTA ParisTech (Paris, France)*.
2011 – 2012	**Master's degree in modelisation and numerical simulation, with distinctions**, *CEA (Saclay, France)*.
2007 – 2009	**"Classes préparatoires" in mathematics, physics and chemistry**, *Lycée Massena (Nice, France)*.

Skills

Programming	C, C++, Python, Fortran
HPC	MPI, OpenMP
Meshes	Gmsh, MeshGems
Post-treatment	Paraview, Vizir, Medit
Development	Git, CI, CMake, CTest, CPack, Jenkins, Emacs

Systems	Linux, Mac OS, Windows
Misc.	Matlab, Maple, LaTeX, HTML, CSS
Languages	English (fluent)

Publications

Submitted	J. Viquerat, N. Schmitt, C. Scheid, *Simulating 3D periodic structures at oblique incidences with discontinuous Galerkin time-domain methods : theoretical and practical considerations*, Journal of Computational Mathematics
2019	J. Viquerat, *Efficient time-domain numerical analysis of waveguides with tailored wideband pulses*, Microwave and Optical Technology Letters
2018	J. Viquerat, *Fitting experimental dispersion data with a simulated annealing method for nano-optics applications*, Journal of Nanophotonics, Vol. 12, pp. 036014
2018	N. Schmitt, C. Scheid, J. Viquerat, S. Lanteri, *Simulation of three-dimensional nanoscale light interaction with spatially dispersive metals using a high-order curvilinear DGTD method*, Journal of Computational Physics, Vol. 373, pp. 210 – 229
2017	S. Lanteri, C. Scheid, J. Viquerat, *Analysis of a generalized dispersive model coupled to a DGTD method with application to nanophotonics*, SIAM Journal of Scientific Computing, Vol. 39, pp. 831 – 859
2016	J. Viquerat, S. Lanteri, *Simulation of near-field plasmonic interactions with a local approximation order discontinuous Galerkin time-domain method*, Photonics and Nanostructures-Fundamentals and Applications, Vol. 18, pp. 43 – 58
2016	N. Schmitt, C. Scheid, S. Lanteri, A. Moreau, J. Viquerat, *A DGTD method for the numerical modeling of the interaction of light with nanometer scale metallic structures taking into account non-local dispersion effects*, Journal of Computational Physics, Vol. 316, pp. 396 – 415
2015	J. Viquerat, *Simulation of electromagnetic wave propagation in nano-optics with a high-order discontinuous Galerkin time-domain method*, PhD thesis (see `https://www.archives-ouvertes.fr/tel-01272010/`)
2015	J. Viquerat, C. Scheid, *A 3D curvilinear discontinuous Galerkin time-domain solver for nanoscale light-matter interactions*, Journal of Computational and Applied Mathematics, Vol. 289, pp. 37 – 50
2014	R. Léger, J. Viquerat, C. Durochat, C. Scheid, S. Lanteri, *A parallel non-conforming multi-element DGTD method for the simulation of electromagnetic wave interaction with metallic nanoparticles*, Journal of Computational and Applied Mathematics, Vol. 270, pp. 330 – 342
2013	S. Descombes, C. Durochat, S. Lanteri, L. Moya, C. Scheid, J. Viquerat, *Recent advances on a DGTD method for time-domain electromagnetics*, Photonics and Nanostructures - Fundamentals and Applications, Vol. 11, Issue 4, pp. 291 – 302
2013	S. Tzamtzis, J. Viquerat, J. Yap, M. J. Mullen, G. Burriesci, *Numerical analysis of the radial force produced by the Medtronic-CoreValve and Edwards-SAPIEN after transcatheter aortic valve implantation (TAVI)*, Medical Engineering and Physics, Vol. 35, Issue 1, pp. 125 – 130

Conferences

2018	GDR Ondes, Paris (France), *Diogenes : a DG-based software suite for nano-optics problems*
2014	Acomen, Ghent (Belgium), *A curvilinear discontinuous Galerkin time-domain method for nanophotonics*
2014	Meta, Singapore, *Discontinuous Galerkin time-domain method for nanophotonics*
2013	Waves, Tunis (Tunisia), *Discontinuous Galerkin Time-Domain method for nanophotonics*
2012	GDR Ondes, Troyes (France), *Méthode Galerkin discontinue en domaine temporel pour la propagation d'ondes électromagnétiques en nano-optique*

Teaching and supervising

2014 – 2016	**Supervisor for L3, M1 and M2 internships**, *INRIA (Sophia Antipolis, France).*
2010 – 2011	**Computing science teacher in "Classes préparatoires"**, *Lycée Marcelin Berthelot (Saint-Maur des Fossés, France).*

Hobbies

Sports	Climbing, alpinism, ski-touring, canyoning
Others	Photography