Curriculum Vitae – Pascal Omnes

CEA Saclay, DEN/DANS/DM2S/STMF, 91191 Gif-sur-Yvette Cedex
+33.1.69.08.43.57 pascal.omnes@cea.fr
https://www.researchgate.net/profile/Pascal_Omnes

Education

May 2010. Habilitation Thesis, University Paris XIII. Development and analysis of finite volume methods.

January 1999. PhD in applied mathematics, University Paul Sabatier, Toulouse III. Advisor: Pierre Degond. Numerical solution of the Maxwell-Vlasov equations in the periodic regime. Application to the ion cyclotron resonance isotope separation process.

September 1994. Master degree in numerical analysis, scientific computing and non linear analysis. University Pierre et Marie Curie, Paris VI.

September 1994. Master degree in engineering at École Nationale Supérieure de Techniques Avancées (ENSTA ParisTech), Paris.

Professionnal Experience

Since February 1999. Research Engineer at the French Alternative Energies and Atomic Energy Commission (Commissariat à l'Énergie Atomique et aux Énergies Alternatives). Currently Research Director (highest level of expertise).
Development, analysis, implementation and effective use of finite volume methods for fluid mechanics, chemistry and electromagnetism.
Development, analysis and implementation of tools to ensure accuracy and efficiency of numerical computations: a posteriori error estimation, domain decomposition methods for parallel computing, multi-scale methods.
Applications in the frame of an isotope separation process (contract with former COGEMA), safety studies for the storage of nuclear wastes in deep repositories (contract with ANDRA), spent nuclear fuel reprocessing through liquid-liquid extraction (contract with former AREVA) and simulation of turbulent flows in nuclear reactor cores.

December 1996 – March 1998. National Duty (in replacement of military service) at the Forschungszentrum Karlsruhe, Germany (now Karlsruhe Institute of Technology). Development and implementation of finite volume methods for electromagnetism. Coupling with particle methods for plasma physics. Application to the simulation of ion diodes.

October 1994 – November 1996 and April 1998 – January 1999. PhD student at the French Atomic Energy Commission. Modelisation and numerical simulation in electromagnetism and plasma physics through finite elements and particle methods. Application to the ion cyclotron resonance isotope separation process.

Teaching activities

Since September 2007. Half-time assistant professor, then half-time full professor in applied mathematics at Institut Galilée, University Sorbonne Paris Nord (formerly University Paris 13). *96 teaching hours / year.*

• Applied Mathematics and Scientific Computing Master of Engineering:

Courses and project tutoring in finite volumes for elliptic and parabolic equations.
Project tutoring in the applications of mathematics to industrial processes: modelisation, numerical simulation and interpretation of a simplified liquid-liquid extraction process.
Hands-on sessions on the numerical solution of ordinary differential equations (ODEs) with the C language.
Basic mathematics for engineers: numerical solution of ODEs, numerical quadrature, iterative solution of non-linear equations.

• Mathematics and Computer Science Master of Science:

Optimisation algorithms.
Introduction to modelisation.
Tutoring of numerical projects.

• French-Vietnamese applied mathematics Master of Science:

An introduction to the finite volume method (courses and hands-on sessions taught in English in Ho Chi Minh City).

• Administrative and pedagogical responsibility of the French-Vietnamese applied mathematics Master of Science. 2009–2017: local person in charge at University Paris 13. As of 2017: in charge for the whole French consortium (6 French higher education institutions).

2004–2007. Adjunct faculty at Institut Galilée, University Paris 13. *21 hours / year.*

Courses in finite volume methods.

1999–2007. Adjunct faculty at École Nationale Supérieure de Techniques Avancées (ENSTA ParisTech), Paris. *Between 21 and 45 hours / year.*

Exercises of mathematics for engineers: distributions, Sobolev spaces, variational theory of partial differential equations, approximation of hyperbolic problems by finite differences and of elliptic problems by finite elements.
Project tutoring.

1999–2001. Adjunct faculty at École Centrale Paris. *24 hours / year.*

Exercises of mathematics for engineers.

CEMRACS 1999. *6 hours.*

Exercises for the course of P.-A. Raviart "What models for plasmas; what numerical methods for these models?".

Research supervision

Doctoral students

Arthur Arnoult, University Sorbonne Paris Nord, co-supervision with Caroline Japhet (Sorbonne Paris Nord), *Since October 2021*: Space-time domain decomposition methods for the Stokes and Navier-Stokes equations.

Loïc Balazi Atchy Nillama, CEA and University Paris Saclay, co-supervision with Grégoire Allaire (École Polytechnique), *Since Octobre 2021*: Multiscale finite element methods for the Navier-Stokes equations.

Thibault Vital, CEA and University Paris Saclay, co-supervision with Marion Roy and Dominique You (CEA Saclay), *Since October 2019*: Modelling the physical and chemical behaviour of pollution in the secondary loop of reactors.

Joanna Faddoul, University Sorbonne Paris Nord and University Saint-Joseph, Beyrouth, Liban, co-supervision with Toni Sayah (University Saint-Joseph, Beyrouth, Liban), *Since October 2019*: Numerical analysis of the non-linearly coupled Navier-Stokes / non-stationary convection diffusion reaction equations.

Rebecca El Zahlaniyeh, University Paris 13 and University Saint-Joseph, Beyrouth, Liban, co-supervision with Toni Sayah (University Saint-Joseph, Beyrouth, Liban), *October 2018 – December 2021*, PhD defended on the 7th of December 2021: Study of the coupling of the Darcy equation with the non-stationary convection diffusion reaction equation.

Qingqing Feng, CEA and University Paris Saclay, co-supervision with Grégoire Allaire (École Polytechnique), *March 2018 – September 2019*, PhD defended on the 20th of September 2019: Development of a multiscale finite element method for incompressible flows in heterogeneous media.

Ghina Nassreddine, University Paris 13, co-supervision with Toni Sayah (University Saint-Joseph, Beyrouth, Liban), *November 2017 – December 2020*, PhD defended on the 15th of December 2020: A posteriori error estimations for the large eddy simulation in incompressible fluid dynamics.

Duc Quang Bui, University Paris 13, co-supervision with Caroline Japhet (Paris 13), *October 2016 – June 2021*, PhD defended on the 28th of June 2021: Coupling Parareal and Optimized Schwarz Waveform Relaxation methods in fluid mechanics.

Minh Hieu Do, Université Paris 13, co-supervision with Emmanuel Audusse (Paris 13), Stéphane Dellacherie (CEA) and Yohan Penel (CEREMA), *October 2014 – December 2017*, PhD defended on the 19th of December 2017: Analysis of finite volume schemes for quasi-geostrophic flows at low Froude number.

Paul-Marie Berthe, CEA and University Paris 13, co-supervision with Caroline Japhet (Paris 13), *October 2009 – December 2013*, PhD defended on the

18th of December 2013: Optimized Schwarz Waveform Relaxation Domain decomposition methods for the non stationary convection-diffusion equation discretized by finite volumes.

Anh Ha Le, CEA and University Paris 13, *October 2008 – October 2011*, PhD defended on the 25th of October 2011: A posteriori error estimation for simulation of diffusion and fluid mechanics problems by finite volume techniques.

Siham Layouni, CEA and University Toulouse 3, co-supervision with Komla Domelevo (Toulouse 3), *February 2005 – December 2008*, PhD defended on the 16th of December 2008: A finite volume method for the Maxwell equations in two dimension on arbitrary meshes, and its coupling to the Vlasov equation.

Sarah Delcourte, CEA and University Toulouse 3, co-supervision with Komla Domelevo (Toulouse 3), *October 2004 – September 2007*, PhD defended on the 26th of September 2007: Development of finite volume methods for fluid mechanics.

Post-doctoral researchers

Minh Hoang Le, University Paris 13, co-supervision with Fayssal Benkhaldoun (Paris 13), Marc Bourgeois (IRSN) and Emmanuel Audusse (Paris 13), *2 year, 2013–2015*: a posteriori error estimations for porous media simulations.

Jonathan Jung, LRC Manon (CEA and University Paris 6), co-supervision with Stéphane Dellacherie (CEA), *1 year, 2013–2014*: Analysis of the low Mach inaccuracy of colocalized finite volume schemes.

Amadou Mahamane, CEA, co-supervision with Christophe Le Potier (CEA), *1 year, 2011–2012*: Non-linear finite volume schemes that respect the maximum principle for the Darcy equations.

Delphine Jennequin, CEA, *1 year, 2006–2007*: Preconditioning techniques for the numerical approximation of the Stokes and Navier-Stokes equations.

Students in Master of Engineering or Master of Science

Maxime Piovi (Institut Supérieur Polytechnique Galilée (ISPG), master of engineering), CEA Saclay, *6 months, 2021.*

Pham Minh Huy Huynh (French-Vietnamese applied mathematics master), University Paris 13, co-supervision with Fayssal Benkhaldoun (Paris 13), *3 months, 2018.*

Van Thanh Nguyen (French-Vietnamese applied mathematics master), University Paris 13, co-supervision with Emmanuel Audusse and Minh Hieu Do (Paris 13), *3 months, 2017.*

Duc Quang Bui (French-Vietnamese applied mathematics master), University Paris 13, co-supervision with Caroline Japhet (Paris 13), *3 months, 2016*.

Katia Ait Ameur (University Paris 6, master of science), CEA Saclay, co-supervision with Caroline Japhet (Paris 13), *6 months, 2016*.

Chenyu Zha (ISPG, master of engineering), University Paris 13, *1 day per week during 4 months, 2014–2015*.

Kevin Herilus (ISPG, master of engineering), CEA Saclay, *6 months, 2014*.

Minh Hieu Do (French-Vietnamese applied mathematics master), University Paris 13, co-supervision with Emmanuel Audusse (Paris 13), Stéphane Dellacherie (CEA) and Yohan Penel (UPMC), *3 months, 2014*.

Hafiz Mohamed (ISPG, master of engineering), IRSN, co-supervision with Fayssal Benkhaldoun (Paris 13) and Marc Bourgeois (IRSN), *6 months, 2013*.

Meryem Zarrok (ISPG, master of engineering), University Paris 13, *1 day per week during 4 months, 2012–2013*.

Thi Phuong Kieu Nguyen (French-Vietnamese applied mathematics master and then engineering contract), École Centrale Paris, co-supervision with Anna Rozanova–Pierrat and Frédéric Magoulès (École Centrale Paris), *April 2011 – June 2012*.

Siham Ben Youssef (ISPG, master of engineering), CEA Saclay, *6 months, 2009*.

Siham Ben Youssef (ISPG, master of engineering), CEA Saclay, *1 day per week during 4 months, 2008–2009*.

Lionel Boillot (ISPG, master of engineering), CEA Saclay, *1 day per week during 4 months, 2008–2009*.

Imène Chettab (ISPG, master of engineering), CEA Saclay, co-supervision with Eli Laucoin (CEA), *2 months, 2008*.

Yann Rosenbaum (ISPG, master of engineering), CEA Saclay, *6 months, 2007*.

Yohan Penel (ISPG, master of engineering), CEA Saclay, *1 day per week during 4 months, 2006–2007*.

Laurent N'Guyen (ISPG, master of engineering), CEA Saclay, *6 months, 2006*.

Laurent N'Guyen (ISPG, master of engineering), CEA Saclay, *1 day per week during 4 months, 2005–2006*.

Sarah Delcourte (University of Valenciennes, master of science), CEA Saclay, *6 months, 2004*.

Lekbir Afraites (University Paris Sud, master of science), CEA Saclay, *5 months, 2003*.

Evaluation of research

7 times PhD thesis reviewer

Ophélie Angelini (University Paris-Est, supervised by Robert Eymard, November 2010. *Study of numerical schemes for two-phase flows in deformable porous media for arbitrary meshes. Application to the storage of nuclear wastes*).

Benjamin Martin (École Normale Supérieure de Cachan, supervised by Frédéric Pascal, September 2012. *Development of 2D/3D finite volume solvers for the linear elasticity problem*).

Nancy Chalhoub (University Paris-Est, supervised by Alexandre Ern and Martin Vohralík, December 2012. *A posteriori error estimations for the non-stationary convection-diffusion-reaction equation and applications to finite volumes*).

Huy Cuong Vu Do (University Paris Sud, supervised by Danielle Hilhorst, November 2014. *Numerical methods for flow and transport in porous media*).

Mohammed Azeez Hilal (University of Nantes, supervised by Abdeljalil Nachaoui et Sabah Aziz Al Alyoub, Octobre 2016. *Domain decomposition like methods for solving an electrocardiography inverse porblem*).

Julie Llobell (University of Nice Sophia-Antipolis, supervised by Thierry Goudon, October 2018. *Finite volume schemes on staggered meshes for the gas dynamics*).

Karine Laurent (University Paris-Saclay and IFP Énergies Nouvelles, supervised by Quang Huy Tran and Christophe Berthon, November 2019. *Study of new numerical schemes for the simulation of flows with unfavorable mobility ratio in an EOR context*).

34 times member of a PhD evaluation committee

Sarah Delcourte (26-09-2007, *Development of finite volume methods for fluid mechanics*).

Siham Layouni (16-12-2008, *A finite volume method for the Maxwell equations in two dimension on arbitrary meshes, and its coupling to the Vlasov equation*).

Amadou Mahamane (09-04-2009, *Analysis and error estimation in finite volumes. Application to flows in porous media and to mesh refinement*).

Léo Agélas (22-12-2009, *Multi-point finite volume schemes for non-orthogonal grids*).

Stella Krell (08-09-2010, *Finite volume schemes for complex fluid mechanics*).

Ophélie Angelini (10-11-2010, *Study of numerical schemes for two-phase flows in deformable porous media for arbitrary meshes. Application to the storage of nuclear wastes*).

Anh Ha Le (25-10-2011, *A posteriori error estimation for simulation of diffusion and fluid mechanics problems by finite volume techniques*).

Konstantin Brenner (08-11-2011, *Finite volume methods on arbitrary meshes for non-linear evolution systems*).

Bilal Saad (02-12-2011, *Modelisation and numerical simulation of multicomponent flows in porous media*).

Benjamin Martin (19-09-2012, *Development of 2D/3D finite volume solvers for the linear elasticity problem*).

Zuqi Tang (29-11-2012, *Residual a posteriori error estimators in finite elements for the resolution of electromagnetic problems in potential formulations*).

Nancy Chalhoub (17-12-2012, *A posteriori error estimates for the time-dependent convection–diffusion–reaction equation and application to finite volume methods*).

Thi Thao Phuong Hoang (11-12-2013, *Space-time domain decomposition methods for mixed formulations of flow and transport problems in porous media*).

Paul-Marie Berthe (18-12-2013, *Optimised waveform relaxation domain decomposition method for the non-stationary convection-diffusion equation discretised by finite volumes*).

Thi Hong Cam Luong (31-10-2014, *A posteriori error for elasticity equations. Asymptotic expansion for Stokes problem*).

Huy Cuong Vu Do (25-11-2014, *Numerical methods for flow and transport in porous media*).

Vincent Baron (20-05-2015, *Numerical methods for porous media flows: a posteriori estimations and adaptation strategy*, President of the thesis committee).

Pierre Feron (16-11-2015, *Gradient schemes applied to linear and non-linear elliptic and parabolic problems*).

Sarah Ali Hassan (26-06-2017, *A posteriori error estimates and stopping criteria for solvers using the domain decomposition method and with local time stepping*)

Minh Hieu Do (19-12-2017, *Analysis of finite volume schemes for the quasi-geostrophic flows at low Froude number*)

Léandre Giret (21-06-2018, *Numerical analysis of a non-conforming domain decomposition method for the mutligroup SPN equations*, President of the thesis committee)

Julie Llobell (24-10-2018, *Finite volume schemes on staggered meshes for the gas dynamics*)

Tarek Ghoudi (19-12-2018, *A posteriori analysis and mesh adaptation for underground and free surface flow problems*)

Jad Dabaghi (03-06-2019, *A posteriori error estimations for variational inequalities: application to a diphasic flow in porous media*)

Qingqing Feng (20-09-2019, *Development of a multiscale finite element method for incompressible flows in heterogeneous media*)

Pierrick Quémar (27-09-2019, *Modelisation and numrical analysis of free surface flows écoulements*, President of the thesis committee)

Karine Laurent (07-11-2019, *Study of new numerical schemes for the simulation of flows with unfavorable mobility ratio in an EOR context*)

Ayoub Charhabil (28-09-2020, *Study of underground and surface flow models coupled with solute transport*).

Katia Aït Ameur (09-11-2020, *Contribution to the parallel simulation of diphasic flows and analysis of finite volume schemes on staggered grids*).

Ghina Nassreddine (15-12-2020, *A posteriori estimations for the large eddy simulation in incompressible fluid dynamics*).

Duc Quang Bui (28-06-2021, *New space-time domain decomposition algorithms coupled with the the Parareal algorithm*).

Meriem Bouguezzi (13-07-2021, *Modelling and numerical simulation of the propagation speed of a pitting corrosion*, President of the thesis committee).

Rebecca El Zahlaniyeh (07-12-2021, *Study of the coupling of the Darcy equation with the non-stationary convection diffusion reaction equation*).

Virgile Dubos (14-12-2021, *Numerical methods around shallow water flows: dispersive effects, Coriolis force*, President of the thesis committee).

Article peer reviewer

Reviewer of 28 articles: SIAM Journal on Scientific Computing (4), Journal of Computational Physics (3), International Journal on Finite Volumes (3), Numerical Methods for Partial Differential Equations (3), ESAIM: Mathematical Modelling and Numerical Analysis (2), IMA Journal of Numerical Analysis (2), Moroccan Journal of Pure and Applied Analysis (1), Computer Methods in Applied Mechanics and Engineering (1), Numerical Algorithms (1), Numerische Mathematik (1), Mathematics of Computation (1), Oil & Gas Science and Technology (1), International Journal for Numerical Methods in Fluids (1), ESAIM: Proceedings and Surveys (1), Journal of Applied Mathematics (1), Journal of Scientific Computing (1), Calcolo (1).

Organisation of scientific events, scientific edition

Member of the scientific committee of the "First UM6P Conference on Complexity Analysis of Industrial Systems and Advanced Modeling", Mohammed VI Polytechnic University, Ben Guerir, Morocco, April 2019. http://37.59.44.41/caisam/index.html

Member of the organising committee of the "Vietnamese - French conference in applied mathematics", Ho Chi Minh City, Vietnam, July 2018. https://indico.math.cnrs.fr/event/3023/overview

Member of the organising committee of the "Finite Volume for Complex Applications 8" conference, Lille, June 2017. https://indico.math.cnrs.fr/event/1299/overview

Co-organiser, with Franck Boyer (Institut de mathématiques de Toulouse) of the "Finite volume methods for the Stokes and Navier-Stokes equations" benchmark within the "Finite Volume for Complex Applications 8" conference, Lille, June 2017. https://github.com/FranckBoyer/FVCA8_Benchmark

Co-editor, with Clément Cancès (INRIA Lille – Nord-Europe) of the proceedings of the "Finite Volume for Complex Applications 8" conference, Lille, June 2017.

Member of the organising committee of the conference "Analysis, probability and their applications", Quy Nhon, Vietnam, December 2016. https://indico.math.cnrs.fr/event/1301/overview

Member of the scientific committee and organising committee of the CEA-GAMNI seminar on computational fluid dynamics (2005–2010, then 2019–). http://www-mecaflu.cea.fr/

Member of the editorial board of the SMAI Journal of computational mathematics (Since 2021). https://smai-jcm.centre-mersenne.org/

Member of the editorial board of the International Journal on Finite Volumes (2008–2020). http://ijfv.math.cnrs.fr/

Member of the scientific committee of the Formath-Vietnam International associated laboratory (a structure of the French CNRS, National Center for Scientific Research), since 2011.

Publication list

Scientific editing

Finite Volumes for Complex Applications VIII – Methods and Theoretical Aspects, C. Cancès and P. Omnes (Eds), Springer Proceedings in Mathematics & Statistics, vol. 200, 2017.

Finite Volumes for Complex Applications VIII – Hyperbolic, Elliptic and Parabolic Problems, C. Cancès and P. Omnes (Eds), Springer Proceedings in Mathematics & Statistics, vol. 199, 2017.

Articles in peer-reviewed journals

Q. Feng, G. Allaire, and P. Omnes, Enriched Nonconforming Multiscale Finite Element Method for Stokes Flows in Heterogeneous Media Based on High-order Weighting Functions, *Multiscale Model. Simul.*, 2021.

G. Nassreddine, P. Omnes and T. Sayah, A posteriori error estimates for the Large Eddy Simulation applied to stationary Navier-Stokes equations, *Numer. Methods Partial Differential Eq.*, 2021.

N. Chalhoub, P. Omnes, T. Sayah and R. El Zahlaniyeh, A Posteriori error estimates for the time dependent convection-diffusion-reaction equation coupled with the Darcy system, *Numer. Algor.*, 2021.

S. Dellacherie, J. Jung and P. Omnes, Construction of a low Mach finite volume scheme for the isentropic Euler system with porosity, *ESAIM, Math. Model. Numer. Anal.*, **55**, pp. 1199–1237, 2021.

F. Magoulès, T.P.K. Nguyen, P. Omnes, and A. Rozanova-Pierrat, Optimal Absorption of Acoustic Waves by a Boundary. *SIAM J. Control Optim.*, **59**, pp. 561–583, 2021.

N. Chalhoub, P. Omnes, T. Sayah, and R. El Zahlaniyeh, Full discretization of time dependent convection-diffusion-reaction equation coupled with the Darcy system. *Calcolo* **57**, 4, 2020.

E. Audusse, M.H. Do, P. Omnes and Y. Penel, Analysis of modified Godunov type schemes for the two-dimensional linear wave equation with Coriolis source term on cartesian meshes. *J. Comput. Phys.*, **373**, pp. 91–129, 2018.

E. Audusse, S. Dellacherie, M.H. Do, P. Omnes and Y. Penel, Godunov type scheme for the linear wave equation with Coriolis source term. *ESAIM: Proceedings and Surveys* **58**, pp. 1–26, 2017.

S. Dellacherie, J. Jung, P. Omnes and P.-A. Raviart, Construction of modified Godunov type schemes accurate at any Mach number for the compressible Euler system. *Math. Models Methods Appl. Sci.*, **26**, pp. 2525–2615, 2016.

A.H. Le and P. Omnes, An a Posteriori Error Estimation for the Discrete Duality Finite Volume Discretization of the Stokes Equations. *Math. Model. Numer. Anal.*, **49**, pp. 663–693, 2015.

S. Delcourte and P. Omnes, A discrete duality finite volume discretization of the vorticity-velocity-pressure Stokes problem on almost arbitrary two-dimensional grids. *Numer. Methods Partial Differential Eq.*, **31**, pp. 1–30, 2015.

S. Dellacherie, J. Jung and P. Omnes, Preliminary results for the study of the Godunov Scheme Applied to the Linear Wave Equation with Porosity at Low Mach Number. *ESAIM: Proceedings and Surveys* **52**, pp. 105–126, 2015.

A.H. Le and P. Omnes, Discrete Poincaré inequalities for arbitrary meshes in the discrete duality finite volume context. *ETNA, Electron. Trans. Numer. Anal.*, **40**, pp. 94–119, 2013.

P. Omnes, On the second-order convergence of a function reconstructed from finite volume approximations of the Laplace equation on Delaunay-Voronoi meshes. *Math. Model. Numer. Anal.*, **45**, pp. 627–650, 2011.

S. Dellacherie, P. Omnes and F. Rieper, The influence of cell geometry on the Godunov scheme applied to the linear wave equation. *J. Comput. Phys.*, **229**, pp. 5315–5338, 2010.

P. Omnes, Y. Penel and Y. Rosenbaum, A posteriori error estimation for the discrete duality finite volume discretization of the Laplace equation. *SIAM J. Numer. Anal.* **47**, pp. 2782–2807, 2009.

P. Omnes, Error estimates for a finite volume method for the Laplace equation in dimension one through discrete Green functions. *International Journal on Finite Volumes* **6** (1), 18p., electronic only, 2009.

F. Hermeline, S. Layouni and P. Omnes, A finite volume method for the approximation of Maxwell's equations in two space dimensions on arbitrary meshes. *Journal of Computational Physics* **227**, pp. 9365–9388, 2008.

P. Omnes, Numerical and physical comparisons of two models of a gas centrifuge. *Computers & Fluids* **36**, pp. 1028–1039, 2007.

S. Delcourte, K. Domelevo and P. Omnes, A discrete duality finite volume approach to Hodge decomposition and div-curl problems on almost arbitrary two-dimensional meshes. *SIAM J. Numer. Anal.* **45**, pp. 1142–1174, 2007.

K. Domelevo and P. Omnes, A finite volume method for the Laplace equation on almost arbitrary two-dimensional grids. *Math. Model. Numer. Anal.* **39**, pp. 1203–1249, 2005.

P. Omnes, Dielectric conductivity of a bounded plasma and its rate of convergence towards its infinite geometry value. *Journal of Plasma Physics* **69**, pp. 449–463, 2003.

P. Omnes and P. Louvet, Self-consistent numerical simulation of isotope separation by selective ion cyclotron resonance heating in a magnetically confined plasma. *Journal of Computational Physics* **172**, pp. 326–347, 2001.

C.-D. Munz, P. Omnes and R. Schneider, A three-dimensional finite-volume solver for the Maxwell equations with divergence cleaning on unstructured meshes. *Computer Physics Communications* **130**, pp. 83–117, 2000; erratum ibid. **135**, p. 260, 2001.

C.-D. Munz, P. Omnes, R. Schneider, E. Sonnendrücker and U. Voß, Divergence correction techniques for Maxwell solvers based on a hyperbolic model. *Journal of Computational Physics* **161**, pp. 484–511, 2000.

Peer-reviewed proceedings of conferences

F. Boyer and P. Omnes, Benchmark Proposal for the FVCA8 Conference: Finite Volume Methods for the Stokes and Navier–Stokes Equations. In *Finite Volumes for Complex Applications VIII – Methods and Theoretical Aspects*, C. Cancès and P. Omnes (Eds), Springer Proceedings in Mathematics & Statistics, vol. 199, pp. 59–71, 2017.

S. Delcourte and P. Omnes, Numerical Results for a Discrete Duality Finite Volume Discretization Applied to the Navier–Stokes Equations. In *Finite Volumes for Complex Applications VIII – Methods and Theoretical Aspects*, C. Cancès and P. Omnes (Eds), Springer Proceedings in Mathematics & Statistics, vol. 199, pp. 141–161, 2017.

E. Audusse, M.H. Do, P. Omnes and Y. Penel, Analysis of Apparent Topography Scheme for the Linear Wave Equation with Coriolis Force. In *Finite Volumes for Complex Applications VIII – Hyperbolic, Elliptic and Parabolic Problems*, C. Cancès and P. Omnes (Eds), Springer Proceedings in Mathematics & Statistics, vol. 200, pp. 209–217, 2017.

P.-M. Berthe, C. Japhet and P. Omnes, Space-time domain decomposition with finite volumes for porous media applications. Domain Decomposition Methods in Science and Engineering XXI, Lecture Notes in Computational Science and Engineering 98, edited by J. Erhel, M.J. Gander, L. Halpern, G. Pichot, T. Sassi, O.B. Widlund, pp. 567–576, 2014.

C. Japhet and P. Omnes, Optimized Schwarz waveform relaxation for porous media applications. Domain Decomposition Methods in Science and Engineering XX, Lecture Notes in Computational Science and Engineering 91, edited by R.E. Bank, M. Holst, O.B. Widlund, J. Xu, pp. 585–592, 2013.

S. Dellacherie and P. Omnes, On the Godunov scheme applied to the variable cross-section linear wave equation. In *Finite Volumes for Complex Applications VI*, J. Fořt, J. Fürst, J. Halama, R. Herbin, and F. Hubert (Eds), Springer Proceedings in Mathematics, Vol. 4, pp. 313–321, 2011.

L. Halpern, C. Japhet and P. Omnes, Nonconforming in time domain decomposition method for porous media applications. Proceedings of the V European Conference on Computational Fluid Dynamics ECCOMAS CFD 2010, J.C.F. Pereira, A. Sequeira and J.M.C. Pereira (Eds) Lisbon, Portugal,14-17 June 2010 ISBN: 978-989-96778-1-4, 17 pages, 2010.

P. Omnes, Numerical solution of elliptic equations by a hybrid diamond - discrete duality finite volume scheme. In *Proceedings of the third international conference on approximation methods and numerical modelling in environment and natural resources, Mamern'09.* B. Amaziane *et al.* (Eds), Editorial Universidad de Granada, pp. 731–736, 2009.

P. Omnes, Benchmark on anisotropic problems. Tests with the discrete duality finite volume method. In *Finite Volumes for Complex Applications V*, R. Eymard and J.-M. Hérard (Eds), ISTE and Wiley & Sons, pp. 919–934, 2008.

P. Omnes, An a posteriori error bound for the discrete duality finite volume discretization of the Laplace equation and application to the adaptive simulation in a domain with a crack. In *Finite Volumes for Complex Applications V*, R. Eymard and J.-M. Hérard (Eds), ISTE and Wiley & Sons, pp. 617–624, 2008.

S. Delcourte, K. Domelevo and P. Omnes, Discrete duality finite volume method for second order elliptic problems. In *Finite Volumes for Complex Applications IV*, F. Benkhaldoun, D. Ouazar and S. Raghay (Eds), Hermes Science publishing, pp. 447–458, 2005.

C.-D. Munz, P. Omnes and R. Schneider, A Godunov-type solver for the Maxwell equations with divergence cleaning. In *Godunov Methods : Theory and Applications*, E.F. Toro (Ed), Kluwer Academic/Plenum Publishers, New York, pp. 647–654, 2001.

C.-D. Munz, P. Omnes and R. Schneider, Enforcing Gauss' law in computational electromagnetics within a finite-volume framework. Selected proceedings of the 8th. international conference on hyperbolic problems; theory numerics, applications, Magdeburg, 2000. In *International series of numerical mathematics* **141**, Birkhäuser Verlag Basel/Switzerland, pp. 755–764, 2001.

C.-D. Munz, P. Omnes, R. Schneider, E. Sonnendrücker, E. Stein, U.Voß and T. Westermann, KADI2D - A Particle in Cell Code based on Finite-Volume Methods. In *Proceedings of the 12th. International Conference on High-Power Particle Beams*, (BEAMS'98), Haifa, Israel, M. Markovits & J. Shiloh (Eds), pp. 541–544, 1998.

Habilitation Thesis

P. Omnes, Développement et analyse de méthodes de volumes finis (Development and analysis of finite volume methods). *Mémoire d'habilitation à diriger des recherches*, Université Paris 13, 2010.
`http://tel.archives-ouvertes.fr/tel-00613239`

Doctoral Thesis

P. Omnes, Résolution numérique des équations de Maxwell-Vlasov en régime périodique. Application à l'étude de la séparation isotopique par résonance cyclotron ionique (Numerical solution of the Maxwell-Vlasov equations in the periodic regime. Application to the ion cyclotron resonance isotope separation process). *Thèse de doctorat de l'Université Paul Sabatier*, Toulouse III, 1999.

List of oral communications (limited to last 5 years)

A posteriori error estimation for adaptive mesh refinement, TrioCFD Seminar, CEA Saclay, October 2021.

Navier-Stokes equations (with Erell Jamelot), Science Festival, La Sorbonne, October 2021.

Multi-scale finite elements and applications in fluid mechanics, Second French-German Workshop on Multiscale Problems, Besançon, September 2021.

A posteriori error estimation, online seminar at the CEA Saclay, February 2021.

Adaptive mesh refinement for the Navier-Stokes equations, CEA-EDF-Framatome online seminar, December 2020.

Multiscale finite elements and applications in fluid mechanics, seminar at the CEA Saclay, June 2020.

Multiscale finite elements and applications in fluid mechanics, modelization and scientific computing seminar, Sorbonne Paris Nord University, June 2020.

Space-time parallel computing, high performance computing, (with C. Japhet and the contribution of C. Coti), Research day of the Institut Galilée, University Paris 13, November 2019.

Rate of numerical diffusion of finite volume schemes, "Keynote Lecture" at the First Conference on Complexity Analysis of Industrial Systems and Advanced Modeling, Mohammed VI Polytechnic University, Ben Guerir, Morocco, April 2019.

Rate of numerical diffusion of finite volume schemes for linear hyperbolic equations, hyperbolic working group, Center for Mathematics and Computer Science, Aix-Marseille University, February 2019.

A posteriori error estimation for the Navier-Stokes equations, CEA Saclay, December 2018.

Rate of numerical diffusion of finite volume schemes for linear hyperbolic equations, Fifteenth International Conference Zaragoza-Pau on Mathematics and its Applications, invited talk at a finite volume mini-symposium, Jaca, Spain, September 2018.

Finite volumes for linear hyperbolic equations and numerical diffusion, mini-course (3 hours) at the GdR MaNu (French CNRS "Mathematics for Nuclear Science" research group `gdr-manu.math.cnrs.fr`) summer school, Roscoff, July 2018.

On the diffusion rate of Godunov type schemes, French national congress on numerical analysis (CANUM), May 2018.

On the treatment of complex situations in research and development of numerical methods, internal seminar in front of the CEA High Commissioner, March 2018.

Well-balanced numerical schemes for the wave equation with Coriolis source term, workshop on numerical schemes for low Mach number flows, University of Toulouse, November 2017.

Analysis of the loss of accuracy of the Godunov scheme at low Mach number, finite volumes colloquium, University of Nice, March 2017.