

**Bruno DESPRÉS** (born in 1965)

Professor (PR1) in Applied Math. from 2009 Lab. Jacques-Louis Lions,  
University Pierre et Marie Curie  
formerly Research fellow at the CEA-FRANCE from 2004 to 2009  
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### **Vitae**

1988: Diploma of the École Polytechnique, France.

1991: PhD in Numerical Analysis and Applied Mathematics, advisor Patrick Joly. Title : Domain Decomposition Methods for Time Harmonic Wave Equations.

1992: Researcher at the Commissariat à l'Énergie Atomique (CEA).

1996: Habilitation à diriger des recherches (HDR diploma). Title: Contribution à l'analyse mathématique et numérique des problèmes de propagation d'ondes.

1998: Part Time Associate Professor at the University Paris VI

2001-2004: Full Time Associate Professor (PAST) at the University Paris VI, on leave from CEA.

2001-2004: Scientific adviser at CEA.

july 2003 and may 2005: Scientific visitor at the Center for Non Linear Studies (T7), Los Alamos Nat. Lab.

September 2004 until 2008: Back full time at the CEA, and Research Fellow in October 2004.

September 2001 to september 2009: professor in applied mathematics at the Ecole Polytechnique.

September 2009- New appointment: Professor in Applied Math. at the University Pierre et Marie Curie. Scientific adviser at the CEA.

Member of the scientific comitte of the conferences] Multimath, NMCF. Member of the GAMNI group: this group is part of the SMAI.

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**Scientific awards:** 1996 CISI award in scientific computing and numerical analysis, 2002 Blaise Pascal award of the French Academy of Sciences.

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**Recent invitations in international conferences:** NMCF (Numerical Models for Controlled Fusion) 2009, ECCM 2010, ICCS 2010.

Publications are grouped essentially by domain of application.

## New

- [1] B. Despres, F. Lagoutière, and N. Sguin. Weak solutions to friedrichs systems with convex constraints. Technical Report RR11006, LJLL, UPMC, 2011.
- [2] B. Despres and R. Sart. Reduced resistive mhd with general density i: Model and stability results. Technical Report RR11003, LJLL, UPMC, 2011.
- [3] C. Buet, B. Despres, and E. Franck. Design of asymptotic preserving schemes for the hyperbolic heat equation on unstructured meshes. Technical Report RR10039, LJLL, UPMC, 2011.
- [4] B. Despres. A potential lagrangian formulation of ideal mhd. Technical Report RR10003, LJLL, UPMC, 2009. to appear in *J. Hyp. and Diff. Equations*.
- [5] G. Poette, B. Despres, and D. Lucor. Treatment of uncertain material interfaces in compressible flows. *CMAME*, 2011.

## Lagrangian and Eulerian methods for compressible flows (numerics and modeling)

- [6] Bruno Després. Weak consistency of the cell-centered Lagrangian GLACE scheme on general meshes in any dimension. *Comput. Methods Appl. Mech. Engrg.*, 199(41-44):2669–2679, 2010.
- [7] Bruno Després, Frédéric Lagoutière, Emmanuel Labourasse, and Isabelle Marmajou. An antidissipative transport scheme on unstructured meshes for multicomponent flows. *Int. J. Finite Vol.*, 7(1):36, 2010.
- [8] Bruno Després. *Lois de conservations eulériennes, lagrangiennes et méthodes numériques*, volume 68 of *Mathématiques & Applications (Berlin) [Mathematics & Applications]*. Springer-Verlag, Berlin, 2010.
- [9] G. Carré, S. Del Pino, B. Després, and E. Labourasse. A cell-centered Lagrangian hydrodynamics scheme on general unstructured meshes in arbitrary dimension. *J. Comput. Phys.*, 228(14):5160–5183, 2009.
- [10] Étienne Bernard, Stéphane Del Pino, Erwan Deriaz, Bruno Després, Katerina Jurkova, and Frédéric Lagoutière. Lagrangian method enhanced with edge swapping for the free fall and contact problem. In *CEMRACS 2007*, volume 24 of *ESAIM Proc.*, pages 46–59. EDP Sci., Les Ulis, 2008.

- [11] Emmanuel Labourasse, Bruno Després, Frédéric Lagoutière, and Isabelle Marmajou. The VoFiRe finite volume method applied to multi-component flows on unstructured meshes. In *Finite volumes for complex applications V*, pages 543–551. ISTE, London, 2008.
- [12] Bruno Després and Frédéric Lagoutière. Numerical resolution of a two-component compressible fluid model with interfaces. *Prog. Comput. Fluid Dyn.*, 7(6):295–310, 2007.
- [13] Bruno Després and Constant Mazeran. Lagrangian gas dynamics in two dimensions and Lagrangian systems. *Arch. Ration. Mech. Anal.*, 178(3):327–372, 2005.
- [14] Bruno Després. Symétrisation en variable de Lagrange pour la mécanique des milieux continus et schémas numériques. *Matapli*, (72):45–61, 2003.
- [15] Bruno Després. Lagrangian systems of conservation laws and approximate Riemann solvers. In *Godunov methods (Oxford, 1999)*, pages 233–245. Kluwer/Plenum, New York, 2001.
- [16] Bruno Després. Lagrangian systems of conservation laws. Invariance properties of Lagrangian systems of conservation laws, approximate Riemann solvers and the entropy condition. *Numer. Math.*, 89(1):99–134, 2001.
- [17] Fabienne Beazard and Bruno Després. An entropic solver for ideal Lagrangian magnetohydrodynamics. *J. Comput. Phys.*, 154(1):65–89, 1999.
- [18] Bruno Després. Structure des systèmes de lois de conservation en variables lagrangiennes. *C. R. Acad. Sci. Paris Sér. I Math.*, 328(8):721–724, 1999.
- [19] Bruno Després. Inégalité entropique pour un solveur conservatif du système de la dynamique des gaz en coordonnées de Lagrange. *C. R. Acad. Sci. Paris Sér. I Math.*, 324(11):1301–1306, 1997.

## Material modeling (PDE’s and numerics)

- [20] G. Kluth and B. Després. Discretization of hyperelasticity on unstructured mesh with a cell-centered Lagrangian scheme. *J. Comput. Phys.*, 229(24):9092–9118, 2010.
- [21] B. Després. The weak Rankine Hugoniot inequality. In *Hyperbolic problems: theory, numerics, applications*, pages 439–447. Springer, Berlin, 2008.
- [22] Gilles Kluth and Bruno Després. FV schemes for hyperelastic-plastic models in finite deformations. In *Finite volumes for complex applications V*, pages 511–518. ISTE, London, 2008.

- [23] Gilles Kluth and Bruno Després. Perfect plasticity and hyperelastic models for isotropic materials. *Contin. Mech. Thermodyn.*, 20(3):173–192, 2008.
- [24] Bruno Despres. A geometrical approach to nonconservative shocks and elastoplastic shocks. *Arch. Ration. Mech. Anal.*, 186(2):275–308, 2007.
- [25] Bruno Després. Relation de Rankine-Hugoniot faible pour les lois de conservation avec contraintes primitives convexes. *C. R. Math. Acad. Sci. Paris*, 342(1):73–78, 2006.

## Radiation

- [26] Bruno Després and Christophe Buet. Grey radiative hydrodynamics—hierarchy of models and numerical approximation. In *Mathematical models and numerical methods for radiative transfer*, volume 28 of *Panor. Synthèses*, pages 1–33. Soc. Math. France, Paris, 2009.
- [27] C. Berthon, C. Buet, J.-F. Coulombel, B. Desprès, J. Dubois, T. Goudon, J. E. Morel, and R. Turpault. *Mathematical models and numerical methods for radiative transfer*, volume 28 of *Panoramas et Synthèses [Panoramas and Syntheses]*. Société Mathématique de France, Paris, 2009. Papers from the Summer School held at Université Nice Sophia Antipolis, Nice, July 31–August 4, 2007.
- [28] Christophe Buet and Bruno Despres. Asymptotic preserving and positive schemes for radiation hydrodynamics. *J. Comput. Phys.*, 215(2):717–740, 2006.

## Time harmonic wave equations

- [29] Francis Collino and Bruno Després. An iterative method for time-harmonic integral Maxwell’s equations. In *Coupling of fluids, structures and waves in aeronautics*, volume 85 of *Notes Numer. Fluid Mech. Multidiscip. Des.*, pages 171–181. Springer, Berlin, 2003.
- [30] Olivier Cessenat and Bruno Després. Using plane waves as base functions for solving time harmonic equations with the ultra weak variational formulation. *J. Comput. Acoust.*, 11(2):227–238, 2003. Medium-frequency acoustics.
- [31] Francis Collino and Bruno Despres. Integral equations via saddle point problems for time-harmonic Maxwell’s equations. *J. Comput. Appl. Math.*, 150(1):157–192, 2003.

- [32] F. Collino and B. Despres. Integral equations and saddle point formulation for scattering problems. In *Nonlinear partial differential equations and their applications. Collège de France Seminar, Vol. XIV (Paris, 1997/1998)*, volume 31 of *Stud. Math. Appl.*, pages 193–212. North-Holland, Amsterdam, 2002.
- [33] Bruno Despres. Quadratic functional and integral equations for harmonic wave equations. In *Mathematical and numerical aspects of wave propagation (Golden, CO, 1998)*, pages 56–64. SIAM, Philadelphia, PA, 1998.
- [34] Olivier Cessenat and Bruno Despres. Application of an ultra weak variational formulation of elliptic PDEs to the two-dimensional Helmholtz problem. *SIAM J. Numer. Anal.*, 35(1):255–299 (electronic), 1998.
- [35] Bruno Després. Fonctionnelle quadratique et équations intégrales pour les problèmes d’onde harmonique en domaine extérieur. *RAIRO Modél. Math. Anal. Numér.*, 31(6):679–732, 1997.
- [36] Jean-David Benamou and Bruno Després. A domain decomposition method for the Helmholtz equation and related optimal control problems. *J. Comput. Phys.*, 136(1):68–82, 1997.
- [37] Bruno Després. Fonctionnelle quadratique et équations intégrales pour les équations de Maxwell harmoniques en domaine extérieur. *C. R. Acad. Sci. Paris Sér. I Math.*, 323(5):547–552, 1996.
- [38] Bruno Després. Domain decomposition method and the Helmholtz problem. II. In *Second International Conference on Mathematical and Numerical Aspects of Wave Propagation (Newark, DE, 1993)*, pages 197–206. SIAM, Philadelphia, PA, 1993.
- [39] Bruno Després, Patrick Joly, and Jean E. Roberts. A domain decomposition method for the harmonic Maxwell equations. In *Iterative methods in linear algebra (Brussels, 1991)*, pages 475–484. North-Holland, Amsterdam, 1992.
- [40] Bruno Després. Domain decomposition method and the Helmholtz problem. In *Mathematical and numerical aspects of wave propagation phenomena (Strasbourg, 1991)*, pages 44–52. SIAM, Philadelphia, PA, 1991.
- [41] Bruno Després. Décomposition de domaine et problème de Helmholtz. *C. R. Acad. Sci. Paris Sér. I Math.*, 311(6):313–316, 1990.

## Finite Volume schemes

- [42] S. Del Pino, B. Després, P. Havé, H. Jourdain, and P. F. Piserchia. 3D finite volume simulation of acoustic waves in the earth atmosphere. *Comput. & Fluids*, 38(4):765–777, 2009.

- [43] Bruno Després. Uniform asymptotic stability of Strang’s explicit compact schemes for linear advection. *SIAM J. Numer. Anal.*, 47(5):3956–3976, 2009.
- [44] Bruno Després. Stability of high order finite volume schemes for the 1D transport equation. In *Finite volumes for complex applications V*, pages 337–342. ISTE, London, 2008.
- [45] Bruno Després. Finite volume transport schemes. *Numer. Math.*, 108(4):529–556, 2008.
- [46] Bruno Després and Frédéric Lagoutière. Genuinely multi-dimensional non-dissipative finite-volume schemes for transport. *Int. J. Appl. Math. Comput. Sci.*, 17(3):321–328, 2007.
- [47] Bruno Després and Raphaël Loubère. Convergence and sensitivity analysis of repair algorithms in 1D. *Int. J. Finite Vol.*, 3(1):27, 2006.
- [48] Bruno Després. Convergence of non-linear finite volume schemes for linear transport. In *Notes from the XIth Jacques-Louis Lions Hispano-French School on Numerical Simulation in Physics and Engineering (Spanish)*, pages 219–239. Grupo Anal. Teor. Numer. Modelos Cienc. Exp. Univ. Cádiz, Cádiz, 2004.
- [49] Bruno Després. Discrete compressive solutions of scalar conservation laws. *J. Hyperbolic Differ. Equ.*, 1(3):493–520, 2004.
- [50] Bruno Després. An explicit a priori estimate for a finite volume approximation of linear advection on non-Cartesian grids. *SIAM J. Numer. Anal.*, 42(2):484–504 (electronic), 2004.
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- [52] Bruno Després.  $L^p$  estimates of convergence for finite volume approximation of linear advection on arbitrary grids. In *Finite volumes for complex applications, III (Porquerolles, 2002)*, pages 173–180. Hermes Sci. Publ., Paris, 2002.
- [53] Bruno Després and Frédéric Lagoutière. Contact discontinuity capturing schemes for linear advection and compressible gas dynamics. *J. Sci. Comput.*, 16(4):479–524 (2002), 2001.
- [54] Bruno Després and Frédéric Lagoutière. Generalized Harten formalism and longitudinal variation diminishing schemes for linear advection on arbitrary grids. *M2AN Math. Model. Numer. Anal.*, 35(6):1159–1183, 2001.

- [55] Bruno Després and Frédéric Lagoutière. A longitudinal variation diminishing estimate for linear advection on arbitrary grids. *C. R. Acad. Sci. Paris Sér. I Math.*, 332(3):259–263, 2001.
- [56] Bruno Després and Frédéric Lagoutière. Un schéma non linéaire anti-dissipatif pour l'équation d'advection linéaire. *C. R. Acad. Sci. Paris Sér. I Math.*, 328(10):939–944, 1999.

## Uncertainty quantification and propagation

- [57] Gaël Poëtte, Bruno Després, and Didier Lucor. Uncertainty quantification for systems of conservation laws. *J. Comput. Phys.*, 228(7):2443–2467, 2009.

## Miscellaneous (including some DG)

- [58] Jean-Baptiste Apoung Kamga and Bruno Després. CFL condition and boundary conditions for DGM approximation of convection-diffusion. *SIAM J. Numer. Anal.*, 44(6):2245–2269, 2006.
- [59] B. Després, S. Jaouen, C. Mazeran, and T. Takahashi. Numerical study of a conservative bifluid model with interpenetration. In *Numerical methods for hyperbolic and kinetic problems*, volume 7 of *IRMA Lect. Math. Theor. Phys.*, pages 177–207. Eur. Math. Soc., Zürich, 2005.
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- [61] Fabrice Bethuel, Bruno Despres, and Didier Smets. Symmetrization of dissipative-dispersive traveling waves for systems of conservation laws. *Phys. D*, 200(1-2):105–123, 2005.
- [62] B. Després, F. Lagoutière, and D. Ramos. Stability of a thermodynamically coherent multiphase model. *Math. Models Methods Appl. Sci.*, 13(10):1463–1487, 2003.
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- [65] Bruno Després. The Borg theorem for the vectorial Hill’s equation. *Inverse Problems*, 11(1):97–121, 1995.
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- [67] Bruno Després. *Méthodes de décomposition de domaine pour les problèmes de propagation d’ondes en régime harmonique. Le théorème de Borg pour l’équation de Hill vectorielle*. Institut National de Recherche en Informatique et en Automatique (INRIA), Rocquencourt, 1991. Thèse, Université de Paris IX (Dauphine), Paris, 1991.