

# Curriculum Vitae

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*Born* August 08, 1968, N'Djemena (Tchad)

*Citizenship* France

*Children* Nora, born July 2008 and Pierre, born March 2012

## *Education*

1986 Baccalauréat, Section C  
1988 Ecole Normale Supérieure de Lyon  
1991 Agrégation de Mathématique (9<sup>ème</sup>)  
1994 Ph. D. Thesis adviser: G. Métivier  
1998 Habilitation à Diriger des Recherches

## *Positions held*

1988-92 Elève de l'Ecole Normale Supérieure de Lyon  
1992-99 Chargé de Recherche au CNRS  
1999-03 Professeur à l'université de Lyon  
2003-16 Professeur à l'université de Rennes 1

## *Research interests*

Analysis of Partial Differential Equations and propagation of singularities with a special interest for fluid mechanics, electromagnetism and plasma physics. Conservation laws including in particular Euler, Vlasov and Maxwell equations. Nonlinear, diffractive and supercritical geometric optics. Dynamical systems, intermittency, turbulent flows.

## List of publications

- [1] *Mathematical perspectives in plasma turbulence*, Research and Reports on Mathematics (2018), 2:2.
- [2] (with A. Fontaine) *Dispersion relations in hot magnetized plasmas*, Journal of Mathematical Analysis and Applications (2018).
- [3] *Anomalous transport*, Journal of Differential Equations, Vol. 262, Number 3, 2017, 2987–3033.
- [4] (with A. Fontaine) *Dispersion relations in cold magnetized plasmas*, Kinetic and Related Models, AIMS, 2017, 10 (2), pp.373-421.
- [5] *Can one hear whistler waves?*, Comm. Math. Phys. 338 (2015), 641–703.
- [6] (with A. Klak) *On the Production of Dissipation Through the Interactions of Forced Oscillating Waves in Fluid Dynamics*, Analysis and Applications, 12 (2014), no. 1, 1–61.
- [7] (with I. Gallagher, T. Paul, L. Saint-Raymond) *Semiclassical and spectral analysis of oceanic waves*, Duke Mathematical Journal, Vol. 161, No. 5, 2012, 845 - 892.
- [8] (with T. Paul) *On some geometry of propagation in diffractive time scales*, Discrete and Continuous Dynamical Systems - Series A (DCDS-A), Volume 32, Issue 2, 2012, 499 - 538.
- [9] (with M. Houbad) *A class of large amplitude oscillating solutions for three dimensional Euler equations*, Communications on Pure and Applied Analysis, Volume 11, Number 5, 2012, 1661 - 1697.
- [10] *Sur un problème de stabilité posé en optique géométrique non linéaire sur-critique*, Séminaire: Equations aux Dérivées Partielles, Exp. No. V, 2010.
- [11] *A deterministic model for the propagation of turbulent oscillations*, Journal of Differential Equations 247, 2009, no. 9, 2637 - 2679.
- [12] (with I. Gallagher, T. Paul, L. Saint-Raymond) *Trapping Rossby waves*, C. R. Math. Acad. Sci. Paris 347, 2009, no. 15-16, 879 - 884.
- [13] *Recent results in large amplitude monophasic nonlinear geometric optics*, Instability in Models connected with Fluid Flows, 267 - 288, Int. Math. Ser. (N. Y.), 6, Springer, New York, 2008.
- [14] (with M. Houbad) *Compatibility conditions to allow some large amplitude WKB analysis for Burger's type systems*, Phys. D, 237, 2008, no. 10-12, 1429 - 1443.
- [15] (with O. Guès) *Counter-examples to concentration-cancellation*, ARMA, 189, 2008, no. 3, 363 - 424.
- [16] *Cascade of phasis in turbulent flows*, Bulletin de la Société mathématique de France 134, fascicule 1 (2006), 33-82.
- [17] *Sur la propagation de quasi-singularités*, S. EDP (2005), Exp. VIII, 20 p.
- [18] *Propagation of oscillations in real vanishing viscosity limit*, Comm. Math. Phys. 247 (2004), no. 3, 655–695.

- [19] (with O. Guès and G. Métivier) *Large-amplitude high-frequency waves for quasilinear hyperbolic systems*, Adv. Differential Equations 9 (2004), no. 7-8, 829–890.
- [20] (with O. Guès and G. Métivier) *Oscillations fortes sur un champ linéairement dégénéré*, Ann. Sci. Ecole Norm. Sup. (4) 36 (2003), no. 5, 691–745.
- [21] *Regularizing effects for multidimensional scalar conservation laws*, Ann. Inst. H. Poincaré Anal. Non Linéaire 17 (2000), no. 4, 413–472.
- [22] (with M. Sablé-Tougeron) *Optique géométrique oscillante en présence d'un grand choc*, Ann. Sc. Norm. Sup. Pisa Cl. Sci. (4) 28 (1999), no. 1, 41–98.
- [23] *Effet régularisant pour une loi de conservation scalaire multidimensionnelle*, Séminaire sur les EDP (1998), Exp. No. XXIV, 15 p.
- [24] *Systèmes de lois de conservation et stabilité BV*, Mémoires de la Société Mathématique de France, 75, (1998), 120 pages.
- [25] *About the Cauchy problem for a system of conservation laws*, Geometrical optics and related topics (Cortona, 1996), 95–116, Progr. Nonlinear Differential Equations Appl., 32, Birkhauser Boston, Boston, MA, 1997.
- [26] *The modulation equations of non linear geometric optics*, Comm. in Part. Diff. Eq., 21 (1996), 1119-1140.
- [27] *Justification de l'optique géométrique non linéaire pour un système de lois de conservation*, Duke Mathematical Journal, 37, No 2 (1997), 213-268.
- [28] *Oscillations de faible amplitude pour les systèmes  $2 \times 2$  de lois de conservation*, Asymptotic Analysis, 12 (1996), 1-24.
- [29] *Propagation d'oscillations près d'un point diffractif*, J. Math. Pures Appl., 75, (1996), 419-467.
- [30] *Sur la propagation d'oscillations au voisinage d'un point diffractif*, Journées EDP, Saint-Jean-de-Monts (1994), Exp. No. III, 8 p.
- [31] *Justification de l'optique géométrique non linéaire pour un système de lois de conservation*, Séminaire EDP (1994), Exp. No. XV, 14 p.

### Ph. D. students

- Mekki Houbad, Ph. D. in 2010, assistant professor at the university of Tlemcen (Algeria).
- Aurélien Klak, Ph. D. in 2011, professeur agrégé en classes préparatoires.
- Adrien Fontaine, Ph. D. in 2017, professeur agrégé en classes préparatoires.

### Major administrative responsibilities<sup>1</sup>

- Project manager of the ANR-blanc research program SCASEN, 190 000 euros (2008-11) ;
- Director of the Unité de Formation à la Recherche (UFR) at the university of Rennes 1 (2011-13).

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<sup>1</sup>A more detailed version which describes period by period the research activities (invitations, editorial activities, organization of conferences, membership of committees, international programs, popularisation of mathematics, ...), the teaching activities and the miscellaneous administrative responsibilities is available on request.