Frédéric Menous

Maître de Conférences (Paris-Sud University)
Doctor in Mathematics (Paris-Sud University)
Agrégé, former student of the ENS Ulm

Personal Details :

Name	Menous
First name	Frédéric
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Education :

1994-1996	**PhD** in mathematics under the supervision of Professor Jean Ecalle at Paris-Sud : ”Les bonnes moyennes uniformisantes et leurs applications à la resommation réelle”.
1991-1995	Student at the ENS Ulm.

Miscellaneous activities :

2007-2008	Coorganiser (with F. Fauvet, F. Patras, D. Sauzin) of the seminar “Algebres de Hopf et calcul moulien”.
2009	Corganiser of a conference : Asymptotics in dynamics, geometry and PDEs. Generalized Borel summation. CRM, Pisa, Italy, October 12-16, 2009
2004-2011	Member of the “Conseil National des Universités”.

Research area :

My recent research focuses on the use of mould calculus in various problems : conjugacy classes for q–difference equations, formulas and estimates for the Birkhoff decomposition of identity-tangent diffeomorphisms (which is related to renormalization in Quantum Field Theory). In such examples, mould calculus reduces the computation of some formal (or analytic) diffeomorphism to the computation of a character on a combinatorial Hopf algebra (shuffle, quasishuffle, decorated trees). This interpretation of mould calculus in terms of Hopf algebra is the first step of a promising investigation of the interactions between the study of Dynamical Systems, Combinatorial Hopf Algebras and Quantum Field Theory. More recently, these investigations lead for example to some new results on the Connes-Moscovici Hopf algebra (using Mould Calculus), on the study of new Lie idempotents (joint work with J.-Y. Thibon and J.-C. Novelli) related to Catalan numbers. Some first results also suggests, on very simple example, that the ideas of renormalisation in quantum field theory do apply in the study of dynamical system and provide a new way to interpret normal forms.

Publications :

Last Five publications

1. Menous Frédéric. *Formulas for the Connes-Moscovici Hopf Algebra.* Ebrahimi-Fard, Kurusch (ed.) et al., Combinatorics and physics. Mini-workshop on renormalization, December 15--16, 2006, conference on combinatorics and physics, March 19--23, 2007, Bonn, Germany. Providence, RI: American Mathematical Society (AMS). Contemporary Mathematics 539, 269-285 (2011)
2. Brouder, Christian; Frabetti, Alessandra; Menous, Frédéric. *Combinatorial Hopf algebras from renormalization*. J. Algebr. Comb. 32, No. 4, 557-578 (2010).
3. Menous, Frédéric. *Formal differential equations and renormalization*. (English summary) Renormalization and Galois theories, IRMA Lect. Math. Theor. Phys., 15, Eur. Math. Soc., Zürich, 2009.
4. Menous, Frédéric. *On the stability of some groups of formal diffeomorphisms by the Birkhoff decomposition*. Adv. Math. 216 (2007), no. 1, 1–28.
5. Menous, Frédéric. *An example of local analytic q-difference equation: analytic classification*. Ann. Fac. Sci. Toulouse Math. (6) 15 (2006), no. 4, 773–814.

Papers in Journals 6.

Proceedings 4.

Recent Talks :

2011

1. *A small survey on vector fields and Hopf algebras.* Dyson-Schwinger Equations and Faà di Bruno Hopf Algebra in Physics and Combinatorics, Strasbourg, 27 juin--1 juillet 2011.

2009

1. *Les difféomorphismes tangents à l'identité et les algèbres de Hopf combinatoires*. Journées Calcul Moulien, Renormalisation et Algèbres de Hopf, Orsay ,5-6 février 2009.

2008

1. *Mould Calculus, Combinatorial Hopf Algebras and the Jacobian Conjecture*. Conférence Algèbre combinatoire et Arbres in Lyon, 26u201330 may 2008.