

# Jean-Matthieu Etancelin

## Assistant professor in Mathematics

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## Current position

**Associate professor** University of Pau, Mathematics and their applications lab.

**Teaching** Math, Applied Math and HPC courses in Licence and Master degree, UPPA

## Experiences

**01/2015 – 08/2017** **Research engineer, expert in GPU technologies**, ROMEO HPC Center of Reims, CReSTIC, URCA

**GPU Application Lab:** Expertise in porting and optimisation of GPU accelerated codes for users.

**Technology watch:** Specific libraries, softwares and tools for exploiting heterogeneous clusters.

**Communication:** courses in GPU technologies and hybrid computing to users and students.

Development of a web-based HPC teaching platform [1]. Contributing to scientific communications [2, 3, 4, 5, 6].

**Teaching:** 86h in Master's degree in Computer Science, URCA

**Collaborations:**

ONERA: Optimisation and upscaling of a multi-GPU high order finite volumes research code based on a LES method for realistic aerodynamic profiles [5, 6],

ICMR (University of Reims) and ATOS: Optimization of a GPU code for molecular systems study based on non covalent interactions in the context of genetic algorithm [2],

CORIA (University of Rouen) : Preliminary study of GPU porting of the two-phase combustion code Yales2 [7],

IRMA (University of Strasbourg) : GPU porting of a research code on plasmas simulations, Maison de la Simulation: Design of an aggregation tool for renergy performances.

**10/2015 Rapid Analytics and Model Prototyping**

*Deeplearning challenge for pollinating insects images using GPUs*

Laboratoire de l'Accélérateur Linéaire, University of Paris South and Musée National d'Histoire Naturelle

**10/2011 – 12/2014 PhD in Applied Mathematics:**

**Title:** Model coupling, multiscale algorithms and hybrid computing

**Place:** Laboratoire Jean Kuntzmann, Université Joseph Fourier, Grenoble

**Supervisors:** G.-H. Cottet et C. Picard

**Research:** Analysis and extension of a remeshed particle method, multiscale algorithms implementation on GPU, multi-CPU/multi-GPU hybrid computations on regional and local clusters, applications to turbulent flows simulation.

**Communication:** National [8] and international conferences [9, 10], peer reviewed articles [11], user and developer technical report.

**C3I certification:** HPC certification, GENCI.

**Teaching:** Computer science and programming techniques (135 h, Cours/TD/TP, L1), multivariate functions and linear algebra (36 h, TD, L2), Scilab practical session: image, signal, interpolation, curves and surfaces (27 h, TP, L1).

PhD defended on the 4th of december 2014

**03/2013 Semaine d'Étude Mathématiques et Entreprises**, Laboratoire Jean Kuntzmann, Grenoble

Exploring an industrial problem by PhD students and graduate.

Kolor project: *Sparce modeling of colors transfert functions with Bezier curves.*

- 07/2012 – 08/2012** **Centre d'Eté Mathématique de Recherche Avancée en Calcul Scientifique (CEM-RACS)**, Centre International de Rencontres Mathématiques, Marseille  
Industrial research project in an academic context.  
Cisco project: *Cloud computing elasticity as a query transport*. Numerical simulation of the behavior of a virtual machines set based on a finite volume scheme to automate cloud elasticity [12].
- 10/2010 – 06/2011** **Research internship:** *Evaluating of stretching term various formulations in 3D Vortex Blob method and applications to crossflow jets and vorticity rings*, Laboratoire Ondes et Milieux Complexes (LOMC), Université du Havre  
Numerical simulation of crossflow jet. Study of numerical instabilities on vorticity rings.
- 06/2010 – 10/2010** **Stage ingénieur:** Numerical characterisation of marine current turbines, Institut Français de Recherche pour l'Exploitation de la MER (IFREMER), Boulogne-Sur-Mer et LOMC, Université du Havre  
Numerical simulations of turbulent flow interacting with marine current turbine [13].

## Education

- 10/2011 – 12/2014** **PhD in Applied Mathematics:**  
**Title:** Model coupling, multiscale algorithms and hybrid computing  
**Place:** Laboratoire Jean Kuntzmann, Université Joseph Fourier, Grenoble  
**Supervisors:** G.-H. Cottet et C. Picard  
**Jury:**  
 Stéphane Labbé, PR, Université Joseph Fourier  
 Florian De Vuyst, PR, École Normale Supérieure de Cachan  
 Philippe Helluy, PR, Université de Strasbourg  
 Guillaume Balarac, MCF, Grenoble INP  
 Georges-Henri Cottet, PR, Université Joseph Fourier  
 Alexis Herault, MCF, Conservatoire National des Arts et Métiers  
 Christophe Picard MCF, Grenoble INP  
 Christophe Prud'homme, PR, Université de Strasbourg  
 Jean-Baptiste Lagaert, MCF, Université Paris-Sud  
**Funding:** French ANR Project HAMM (ANR-10-COSI-0009)
- 06/2011** **Mathematics Engineer**, Institut National des Sciences Appliquées de Rouen  
Numerical analysis, differential calculus, software engineering, artificial intelligence, inverse problems, non linear automatic control
- 06/2011** **Master 2 Research: Mathematics and Computer Science of complex and distributed systems**, Université du Havre  
Complex systems modeling, non linear analysis, dynamic systems, complexity and interaction networks, code mobility.

## Technical skills

- Parallel computing** CUDA, OpenCL, OpenACC, OpenMP, MPI  
**Programming** Python, C/C++, Fortran, Shell Unix  
**Tools** Jupyter, TAU, Scalasca, git, svn, ParaView, HDF5, Gnuplot, L<sup>A</sup>T<sub>E</sub>X  
**Languages** French: native, English: fluent (TOEIC: 830/990, 2010)

## Collective responsibilities

- 2015–2017** Animating activities of the Maison de la Simulation de Champagne-Ardenne. Participating in the organization of ROMEO annual scientific day
- 2012–2014** Represent PhD student for IT laboratory management
- 10/2012** Organization of the welcome day for new PhD and post-doc

## Interests

Mountain sports (hiking, skiing, running), saxophone, piano, board games, cooking.

## Références

### Peer reviewed journal articles

- [2] G. Rubez, **J.-M. Etancelin**, X. Vigouroux, M. Krajecki, J.-C. Boisson, E. Hénon, "GPU Accelerated Implementation of NCI Calculations Using Promolecular Density". *Journal of Computational Chemistry* 38.14 (May 2017). DOI: 10.1002/jcc.24786.
- [8] G.-H. Cottet, **J.-M. Etancelin**, F. Pérignon, C. Picard, F. De Vuyst, C. Labourdette, "Is GPU the Future of Scientific Computing ?" *Annales mathématiques Blaise Pascal* 20.1 (Jan. 2013). DOI: 10.5802/ambp.322.
- [11] G.-H. Cottet, **J.-M. Etancelin**, F. Pérignon, C. Picard, "High Order Semi-Lagrangian Particle Methods for Transport Equations: Numerical Analysis and Implementation Issues". *ESAIM: Mathematical Modelling and Numerical Analysis* 48.4 (July 2014). DOI: 10.1051/m2an/2014009.

### Peer reviewed conference proceedings

- [1] A. Renard, **J.-M. Etancelin**, M. Krajecki, "romeoLAB: A High Performance Training Platform for HPC, GPU and DeepLearning". *High Performance Computing*. Latin American High Performance Computing Conference. Communications in Computer and Information Science. Springer, Cham, Sept. 20, 2017. DOI: 10.1007/978-3-319-73353-1\_4.
- [5] J.-M. Le Gouez, **J.-M. Etancelin**, "Numerical Properties and GPU Implementation of a High Order Finite Volume Scheme". *TI 2015 - 4th International Conference on Turbulence and Interactions*. Vol. 135. Cargèse, France, Nov. 2015.
- [9] **J.-M. Etancelin**, G.-H. Cottet, F. Pérignon, C. Picard, "Multi-CPU and Multi-GPU Hybrid Computations of Multi-Scale Scalar Transport". *26th International Conference on Parallel Computational Fluid Dynamics*. Trondheim, Norway, May 2014.
- [10] G. Balarac, G.-H. Cottet, **J.-M. Etancelin**, J.-B. Lagaert, F. Pérignon, C. Picard, "Multi-Scale Problems, High Performance Computing and Hybrid Numerical Methods". *FMI 2013 - Forum "Math-for-Industry" 2013*. Ed. by W. M. et al. Vol. 1. Mathematics for Industry (MFI). Fukuoka, Japan: Springer, Nov. 2013. DOI: 10.1007/978-4-431-54907-9\_18.
- [13] G. Germain, F. Maganga, B. Gaurier, J.-V. Facq, T. Bacchetti, G. Pinon, E. Rivoalen, **J.-M. Etancelin**, "Vers une caractérisation réaliste des conditions de fonctionnement des hydroliennes". 12èmes journées de l'hydrodynamique, Nantes, 2010. Nov. 1, 2010.

### Conferences with selection committee

- [3] **J.-M. Etancelin**, J. Kraus, "Multi-GPU Programming with OpenACC and MPI". *GPU Technology Conference*. Amsterdam, Netherlands, Sept. 2016.
- [4] **J.-M. Etancelin**, "Advanced Tools for GPU Cluster". *GPU Technology Conference*. San Jose, United States, Apr. 2016.
- [6] J.-M. Le Gouez, **J.-M. Etancelin**, "An Optimized Solver for Unsteady Transonic Aerodynamics and Aeroacoustics around Wing Profiles". *GPU Technology Conference*. San Jose, United States, Apr. 2016.
- [7] G. Hautreux, A. Buttari, A. Beck, V. Cameo, D. Lecas, D. Aubert, E. Brun, E. Boyer, F. Malvagi, G. Staffelbach, I. Ast, J. Legaux, G. Lartigue, G. Grasseau, G. Latu, J. Escobar, J. Bigot, J. Derouillat, M. Haefele, N. Renon, P. Parnaudeau, P. Wautelet, P.-F. Lavallee, P. Kestener, R. Lacroix, S. Requena, A. Scemama, V. Moureau, **J.-M. Etancelin**, Y. Meurdesoif, "Pre-Exascale Architectures: OpenPOWER Performance and Usability Assessment for French Scientific Community". *High Performance Computing: ISC High Performance 2017 International Workshops, DRBSD, ExaComm, HCPM, HPC-IODC, IWOPH, IXPUG, P^3MA, VHPC, Visualization at Scale, WOPSSS, Frankfurt, Germany, June 18-22, 2017, Revised Selected Papers*. Ed. by J. M. Kunkel, R. Yokota, M. Taufer, and J. Shalf. Cham: Springer International Publishing, 2017. DOI: 10.1007/978-3-319-67630-2\_23.

- [12] **J.-M. Etancelin**, S. Faure, T. Fevrier, C. Huynh, “Macroscopic Modelization of the Cloud Elasticity”. *ESAIM: Proceedings* 43 (CEMRACS 2012 Dec. 2013). DOI: 10.1051/proc/201343009.

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### PhD thesis

- [14] **J.-M. Etancelin**, “Couplage de modèles, algorithmes multi-échelles et calcul hybride”. PhD thesis. Université de Grenoble, Dec. 4, 2014.