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Personal Information

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Research Interests

- Numerical analysis of PDEs, scientific computing, finite element methods, adaptive refinement.
- Navier-Stokes equations, Maxwell equations, the coupling of free flow and flow in porous media.

Education

- **Texas A&M.** College Station, Texas, USA.
  PhD in Applied Mathematics. *Aug. 2010 - May 2016.*
  - Advisor : Prof. Jean-Luc Guermond.
  - Thesis title: *'Solving the MHD equations in the presence of non-axisymmetric conductors using the Fourier-finite element method'.* `https://oaktrust.library.tamu.edu/handle/1969.1/156971`
- **IPN-Mexico.** Mexico City, Mexico.
  Bachelor in Applied Mathematics. *Aug. 2000 - Aug. 2005.*

Publications and Preprints

1 A. Armandine Les Landes, D. Castanon Quiroz, L. Jeannin, S. Lopez, and R. Masson, **Two-phase geothermal model with fracture network and multi-branch wells.** *Submitted.* `https://hal.archives-ouvertes.fr/hal-03273589`

2 D. A. Di Pietro, D. Castanon Quiroz and A. Harnist, **A Hybrid High-Order method for incompressible flows of non-Newtonian fluids with power-like convective behaviour.** *Accepted for publication.* IMA Journal of Numerical Analysis, 2021. `https://hal.archives-ouvertes.fr/hal-03273118`

3 M. Botti, D. Castanon Quiroz, D. A. Di Pietro, and A. Harnist, **A Hybrid High-Order method for creeping flows of non-Newtonian fluids**. ESAIM: Math. Model Numer. Anal., Volume 55, Number 5, September-October 202, 2021. `https://hal.archives-ouvertes.fr/hal-02519233`

4 D. Castanon Quiroz and D. A. Di Pietro, **A Hybrid High-Order method for the incompressible Navier–Stokes problem robust for large irrotational body forces**. Comput. Math. Appl., 2020. Vol 79, Issue 9. `https://doi.org/10.1016/j.camwa.2019.12.005`, `https://hal.archives-ouvertes.fr/hal-02151236`

5 C. Nore, D. Castanon Quiroz, L. Cappanera and J.-L. Guermond, **Numerical simulation of the Von-Kármán-Sodium experiment**. J. Fluid Mech., 854 (2018) 10 November 2018, 164–195. `https://doi.org/10.1017/jfm.2018.582`

6 C.E. Janson, A. Shiri, J. Jansson, M. Moragues, D. Castanon, L. Saavedra, C. Degirmenci and M. Leoni, **Nonlinear Computations of Heave Motions for a Generic Wave Energy Converter**. Proceedings of NAV 2018: 19th International Conference on Ship and Maritime Research, 2018, 283–290.

http://ebooks.iospress.nl/publication/49237,
https://bird.bcamath.org/handle/20.500.11824/901

7 C. Nore, D. Castanon Quiroz, L. Cappanera and J.-L. Guermond, **Direct numerical simulation of the axial dipolar dynamo in the Von Kármán Sodium experiment**. EPL (Europhysics Letters), Volume 114, Number 6, July 2016. https://doi.org/10.1209/0295-5075/114/65002

8 C. Nore, D. Castanon Quiroz, J.-L. Guermond, J. Léorat and F. Luddens, **Numerical Dynamo Action in Cylindrical Containers**, The European Physical Journal Applied Physics (2015) 70:31101. http://dx.doi.org/9.1051/epjap/2015150049

Articles in preparation

1 D. Castanon Quiroz and D. A. Di Pietro, **A Hybrid High-Order method for the incompressible Navier–Stokes problem robust for large irrotational body forces on polyhedral meshes.**

Work as Referee for Journals

- IMA Journal of Numerical Analysis (IMAJNA).
- Computers and Mathematics with Applications (CAMWA).

Professional Experience

- **INRIA Postdoc-Fellow.** Nice, France.
  Nov. 2019 - Present
  - Member of the INRIA Team Coffee.
    Laboratoire de Mathématiques J. A. Dieudonné. Université Côte d'Azur.
  - Supervisor: Prof. Roland Masson.
  - Research on advanced thermal well modelling for the high performance simulation of geothermal systems.
  - Industrial Partners: BRGM and Storengy.

- **CNRS Postdoc-Fellow.** Montpellier, France.
  Nov. 2017 - Oct. 2019
  - Institut Montpelliérain Alexander Grothendieck (IMAG),
    Université de Montpellier.
  - Supervisor: Prof. Daniele A. Di Pietro.
  - Research on Hybrid-High Order methods (HHO) for the Navier-Stokes eqs.
  - Industrial Partners: EDF-R&D.

- **Postdoc-Fellow.** Bilbao, Spain.
  Aug. 2016 - Aug. 2017
  - Basque Center for Applied Mathematics (BCAM).
  - Supervisor: Johan Jansson.
  - Research on multiphase flow and finite element adaptivity.

- **Software Developer.** Mexico City, Mexico.
  Aug. 2007 - Aug. 2010
  - Insys IT, Incorporated.
  - Developed software tools for computer security such as TCP/IP servers, and clients using C++ and Java.

- **Engineer and Research Assistant.** Mexico City, Mexico.
  Aug. 2005 - Aug. 2007
  - ICAT–UNAM.
  - Developed tool for the simulation of chemical systems using finite elements.

Teaching Experience

- Differential Calculus and Dynamical Systems (in French). Python Labs. Undergraduate level 2nd year. Fall 2021. University Côte d'Azur, Nice, France.
- Math 610: (Master-graduate class) Numerical Methods for PDEs. Recitation and Labs (Matlab). Fall 2013. Texas A&M, USA.
- Math 151: Engineering Mathematics I. Recitation and Labs (Matlab). Fall 2011. Texas A&M, USA.
- Math 141/142: Business Mathematics I & II. Help Sessions. Summer 2011. Texas A&M, USA.
- Math 442: Mathematical Modeling. Grader. Spring 2011. Texas A&M, USA.
- Math 411: Mathematical Probability. Grader. Fall 2010. Texas A&M, USA.

Synergistic Activities

- Co-mentoring the student Hind Bouyri in her master thesis at IMAG (University of Montpellier) titled: *Implementation of Hybrid High-Order methods for convective terms in Code-Saturne*. Thesis supervisor: Daniele Di Pietro.

Participation in Conferences and Invited Seminars

- MexSIAM Annual Meeting, mini-symposium "Modelación matemática de flujo y transporte en medios porosos", Mexico City, Mexico. June 21st-23rd, 2021.
- Séminaire de l'équipe EDP Analyse Numérique, Laboratoire J. A. Dieudonné, Nice, France, May 20th, 2021.
- Séminaire Approx, EDP et Modèles aléatoires, LMPA, Université de Littoral, France. April 22nd, 2021.
- ALGORITMY 2020, mini-session "Pressure-robust discretisations for flow problems and their applications", 10th-15th September, Podbanské, Slovakia, 2020.
- MAFELAP 2019, mini-symposium "Theoretical and computational advances in polygonal and polyhedral methods", 18th–21st June 2019, London, England.
- POEMs 2019, session d'affichage, 29th April–3rd May 2019, Marseille, France.
- Colloquium, CIMAT, 13th December 2019, Guanajuato, Mexico.
- Colloquium, Instituto de Matemáticas, 11th December 2019, Querétaro, Mexico.
- CEDYA 2017, mini-symposium "Tecnología matemática como herramienta clave para la Industria 4.0: algunos casos de éxito", 26th–30th June 2017, Cartagena, Spain.
- COUPLED PROBLEMS 2017, 12th–14th June, 2017, Rhodes, Greece.
- 5to Congreso Metropolitano de Modelado y Simulación Numérica 2017, Mexico City, Mexico.
- Colloquium, Instituto de Matemáticas, 13th May 2019, Querétaro, Mexico.
- Colloquium, CIMAT, 12th May 2017, Guanajuato, Mexico.
- Finite Element Rodeo 2016, 4th–5th May 2016, Texas A&M, Texas, USA.
- Finite Element Rodeo 2015, 27th–28th February 2015, Southern Methodist University, Texas, USA.
- Finite Element Rodeo 2014, 28th February–1st March 2014, UT Austin, Texas, USA.

Research Visits

- Visit to LIMSI, Orsay-Paris, France. Under grant NSF-500401-00001. Summer 2012.

Skills

Spoken Languages: Spanish (native), English (fluent), French (level B2).

Programming Languages: C/C++, Fortran90, Java, Python3, MPI, Unix-Bash.