Oriol Colomés

Duke University, Department of Civil and Environmental Engineering (CEE)
101 Science Drive
27708 Durham (North Carolina, US)

✉ *oriol.colomes@duke.edu*
`www.oriolcolomes.com`

Research Interests

Numerical methods in engineering with an emphasis on solving PDEs:

- Finite element method
- Computational fluid dynamics
- Computational solid dynamics
- Turbulence
- Large scale computing
- Uncertainty Quantification

Education

Mar. 2011 – Mar. 2016 **Ph.D. in Civil Engineering**.
Universitat Politècnica de Catalunya, Barcelona, Spain
- Dissertation: *Large scale Finite Element solvers for the large eddy simulation of incompressible turbulent flows*
- Advisor: Santiago Badia

Sep. 2005 – Mar. 2011 **M.S. in Civil Engineering**.
Universitat Politècnica de Catalunya, Barcelona, Spain
- Final Project: *Footbridge over a railway station in Reus and urban planning of the former cargo area* (in catalan)
- Advisor: Joan Ramon Casas
- Thesis: *Damage analysis in impact problems* (in spanish)
- Advisors: Jose Muñoz, Jose Luis Curiel

Professional development

Feb. 2018 – Mar. 2018 **Emerging Leaders Institute program**.
Duke University, Durham, NC, USA

Oct. 2015 – Jul. 2016 **Pg.C. in Innovation and R&D project management**.
Universitat Oberta de Catalunya, Barcelona, Spain

Fellowships

Jan. 2013 – Jan. 2016 **FI-DGR doctoral fellowship**.
Generalitat de Catalunya

Apr. 2013 – May 2013 **AAD teaching fellowship**.
Generalitat de Catalunya

Oct. 2009 – Jun. 2011 **Enginycat teaching fellowship**.
Generalitat de Catalunya

Awards

May 2017 **Early career travel award for the 14th U.S. National Congress on Computational Mechanics**.
United States Association for Computational Mechanics (USACM)

October 2016 **Early career travel award. SIAM Conference on the Computational Science and Engineering (CSE17)**.
Society for Industrial and Applied Mathematics (SIAM)

Teaching Experience

Jan. 2013 – Jun. 2015 **Universitat Politècnica de Catalunya**, *EETAC*, Castelldefels, Spain.
Teaching Assistant
Includes teaching and preparation of support material for the "Structures and Material Strength" course in Air Navigation Engineering and Airports Engineering degrees.

Oct. 20109 – Jun. 2011 **Universitat Politècnica de Catalunya**, *ETSECCPB*, Barcelona, Spain.
Teaching Assistant
Includes practise lectures for the "Metric Geometry and Representation Systems" course in Civil Engineering degree.

Working Experience

May. 2016 – present **Duke University**, Durham, United States.
Postoctoral Associate
Includes software development and research activities within the Computational Modeling Lab in the department of Civil and Environmental Engineering (CEE). Research topics: Uncertainty Quantification, Variational multiscale error estimators, Solid dynamics. (Supervised by Prof. G. Scovazzi)

Jan. 2013 – Apr. 2016 **Centre Internacional de Mètodes Numèrics en Enginyeria**, Castelldefels, Spain.
Generalitat de Catalunya fellow
Includes software development and PhD research activities within the COMFUS group. Research topics: Variational multiscale methods for incompressible turbulent flows. (Supervised by Prof. S. Badia)

Apr. 2011 – Dec. 2012 **Centre Internacional de Mètodes Numèrics en Enginyeria**, Castelldefels, Spain.
CIMNE fellow
Includes software development and PhD research activities within the COMFUS group. Research topics: Variational multiscale methods for incompressible turbulent flows. (Supervised by Prof. S. Badia)

Publications

- O. Colomés, G. Scovazzi, J. Guilleminot, *On the robustness of Variational Multiscale error estimators for the forward propagation of uncertainty*, Computer Methods in Applied Mechanics and Engineering, Volume 342, December 2018, 384-413.
- O. Colomés, G. Scovazzi, I Sraj, O Knio, O Le Maître, *A Finite Volume Error Estimator Inspired by the Variational Multiscale Approach*, 2018 AIAA Non-Deterministic Approaches Conference, January 2018, 1178.
- G. Wang, G. Scovazzi, L. Nouveau, C. E. Kees, S. Rossi, O. Colomés, A. Main, *Dual-Scale Galerkin Methods for Darcy Flow*, Journal of Computational Physics, Vol 354, February 2018, 111-134.
- X. Zeng, G. Scovazzi, N. Abboud, O. Colomés, S. Rossi, *A dynamic variational multiscale method for viscoelasticity using linear tetrahedral elements*, International Journal for Numerical Methods in Engineering, 2017.

- O. Colomés, S. Badia, *Segregated Runge-Kutta time integration of convection-stabilized mixed finite element schemes for wall-unresolved LES of incompressible flows*, Computer Methods in Applied Mechanics and Engineering, Volume 313, January 2017, 189–215.
- O. Colomés, S. Badia, *Segregated Runge–Kutta methods for the incompressible Navier–Stokes equations*, International Journal for Numerical Methods in Engineering, Vol 105, 8 January 2016, 372-400.
- O. Colomés, S. Badia, J. Principe, *Mixed finite element methods with convection stabilization for large eddy simulation of incompressible turbulent flows*, Computer Methods in Applied Mechanics and Engineering, Volume 304, June 2016, 294–318.
- O. Colomés, S. Badia, R. Codina, J. Principe, *Assessment of variational multiscale models for the large eddy simulation of turbulent incompressible flows*, Computer Methods in Applied Mechanics and Engineering, Vol 285, 1 March 2015, 32-63.

Papers in preparation or submitted

- G. Scovazzi, O. Colomés, N. Abboud, *An arbitrary Lagrangian/Eulerian method for geomechanics: A finite deformation approach*, In preparation.

Conferences, Workshops and Invited Talks

Jul. 2018 O. Colomés, G. Scovazzi, N. Abboud, N. Atallah, *Simulation of Geomechanical Processes Using Viscoelastoplastic Models for Solid Mechanics with Large Deformations*, 13th WCCM, New York, USA.

Jun. 2018 O. Colomés, G. Geraci, M. S. Eldred and G. Scovazzi, *A Multilevel Monte Carlo approach with an embedded Error Estimator for Computational Fluid Dynamics applications*, ECCM-CFD, Glasgow, UK.

Apr. 2018 O. Colomés, G. Scovazzi, J. Guilleminot, *On the robustness of Variational Multiscale error estimators for the forward propagation of uncertainty*, SIAM-UQ, Garden Grove, California, USA.

Jan. 2018 O. Colomés, G. Scovazzi, I Sraj, O Knio, O Le Maître, *A Finite Volume Error Estimator Inspired by the Variational Multiscale Approach*, AIAA SciTech, Orlando, USA.

Aug. 2017 O. Colomés, *The Variational Multiscale method: from stabilization to uncertainty quantification*, Applied Mathematics Colloquium, UNC, Chapel Hill, USA

Jul. 2017 O. Colomés, G. Scovazzi *Variational Multiscale Error Estimators for the Uncertainty Quantification of Mesh Discretization Errors.* US National Conference on Computational Mechanics, Montreal, Canada

Jul. 2017 O. Colomés, S. Badia *Extremely scalable Finite Element solvers for turbulent incompressible flows through segregated Runge-Kutta schemes.* SIAM Anual Meeting, Pittsburgh, USA

Mar. 2017 O. Colomés, G. Scovazzi *Mesh discretization error and uncertainty quantification: a variational multiscale approach.* USACM Uncertainty Quantification and Data-Driven Modelling workshop, Austin, USA.

Feb. 2017 O. Colomés, G. Scovazzi *Mesh discretization error and uncertainty quantification: a variational multiscale approach.* SIAM Conference on Computational Science and Engineering, Atlanta, USA.

May 2015 S. Badia, O. Colomés, P. Kus, A. Martin, M. Olm, J. Principe. *On a scalable multiscale/multiphysics finite element framework.* VI International Conference on Computational Methods for Coupled Problems in Science and Engineering, Venice, Italy.

Apr. 2015 S. Badia, O. Colomés, P. Kus, A. Martin, M. Olm, J. Principe. *FEMPAR: A scalable multiphysics finite element framework.* 1st Pan-American Congress on Computational Mechanics, Buenos Aires, Argentina.

Mar. 2015 S. Badia and O. Colomés. *Segregated Runge-Kutta time integrators for large scale simulations of turbulent incompressible Flows*. SIAM Conference on Computational Science and Engineering, Salt Lake City, USA.

Jul. 2014 O. Colomés, S. Badia, R. Codina and J. Principe. *Variational multiscale large eddy simulation of turbulent incompressible flows*. 11th World Congress on Computational Mechanics, Barcelona, Spain.

Oct. 2013 O. Colomés, S. Badia, R. Codina and J. Principe. *Variational multiscale large eddy simulation of turbulent incompressible flows*. 7th workshop on research in turbulence and transition, Terrassa, Spain.

Nov. 2013 S. Badia, R. Codina, O. Colomés and J. Principe. *Variational multiscale Large Eddy Simulation of turbulent incompressible flows*. VMS 2013, Barcelona, Spain.

Feb. 2013 J. Principe, S. Badia, R. Codina and O. Colomés. *Dynamic nonlinear variational multiscale modelling of turbulent flows*. Advances in Computational Mechanics, San Diego, California USA.

Sep. 2012 S. Badia, O. Colomés, A. Martin, J. Principe. *Substructuring domain decomposition algorithms for parallel 3D fluid-structure interaction simulations*, ECCOMAS 2012, Vienna, Austria.

Research projects

Computational Methods for Fusion Energy (COMFUS).
Starting Grant, Ideas Programme
Project founded by the European Research Grant (ERC)
Reference: 258443
Period: 01/01/2011 - 31/12/2015
Role: Graduate researcher

Uncertainty Quantification in LES Computations of Turbulent Multiphase Combustion in a Scramjet Engine (ScramjetUQ).
Role: Postdoctoral researcher

Patents

J. Castellón, O. Colomés. 2013. *Pre-fabricated structural element*. PCT/ES2014/070320, filed April 16, 2014, and issued December 11, 2014.

Latest update: September 2018