Alejandro Cosimo

Nationality: Argentinian/Italian; Born on Aug 19, 1985
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Background

Software Engineer with a PhD. in Computational Mechanics. Really passionate for the development and implementation of numerical methods targeting the simulation of physical systems. **Skills:** simulation, nonsmooth flexible multibody dynamics, FEM, Software Engineering, C/C++, python, object oriented programming, multithreaded programming, HPC, work on large FE code, Continuous Integration, version control system (git).

Education

PhD. in Engineering in the field of Computational Mechanics; GPA: 9.37/10. *National University of the Littoral*, Santa Fe, Argentina. (26/07/2010 – 17/11/2014)

Software Engineer: five-years professional degree; GPA: 9.03/10. *National University of the Littoral*, Santa Fe, Argentina. (01/03/2004 – 19/09/2009)

Professional experience

10/2018 - Present **Research Engineer** at the University of Liège.

12/2016 - 10/2018 **Assistant Researcher** at the National Scientific and Technical Research Council (CONICET) of Argentina. Currently on research leave.

04/2011 - 10/2018 **Teaching Assistant** at the National University of the Littoral. Currently on research leave.

July 2016 **Short research stay** at the International Center for Numerical Methods in Engineering, Technical University of Catalonia (UPC).

05/2015 - 05/2016 **Postdoctoral Researcher** at the Institute of Applied Mechanics, Technische Universität München (TUM University Foundation Fellowship).

10/2015 - 04/2016 **Ad-honorem Co-Lecturer** at the Institute of Applied Mechanics, Technische Universität München. Winter Semester (WiSe) 2015/2016.

04/2010 - 04/2015 **Doctoral Fellow** at the Research Center for Computational Methods (CIMEC) funded by the Nuclear Regulatory Authority of Argentina.

Skills in detail

- **Programming:** C/C++, python and Matlab. Continuous Integration. **Revision control:** git. **Build tool:** cmake
- **Coding projects:** ***Odin:*** a multibody dynamics code based on the Lie group formalism. ***Oofelie:*** a large finite element/multibody dynamics code. ***Eins:*** a FETI library implemented as PETSc extensions.
- Multithreaded programming. **HPC standards:** MPI and OpenMP. **Math libraries:** PETSc, Eigen, Lapack and MKL-Pardiso
- **Operating Systems:** Linux and Windows
- Nonsmooth Flexible Multibody Dynamics. Lie group methods. Physical modelling in general. The Finite Element Method
- Robotic technology: Robot Operating System (ROS), Gazebo and MoveIt.
- Model Reduction Strategies for linear and highly non-linear problems
- Domain Decomposition techniques, such as Finite Element Tearing and Interconnect (FETI) methods
- The Thermo-Mechano-Metallurgical modelling of welding and additive manufacturing
- **Languages**. *Spanish:* mother tongue. *English*: UNICert Level C1 (DAAD Certificate)

Awards and honors

2010 Recognition of Academic Achievement. National University of the Littoral (granted by RedSport).

2010 Honor Diploma to one of the best averages of the Santa Fe Province in 2009. Awarded by revista Punto Biz, Fundación Banco Municipal de Rosario and SESA Select.

2010 Honor Diploma to the best average of 2009 in Software Engineering, National University of the Littoral. Granted by the Colegio de Ingenieros Especialistas, Santa Fe, Argentina.

Refereed archival Journals

2020 Alejandro Cosimo, Federico Cavalieri, Javier Galvez, Alberto Cardona, and Olivier Brüls. A general purpose formulation for nonsmooth dynamics with finite rotations: Application to the woodpecker toy. *Journal of Computational and Nonlinear Dynamics*, December 2020.

2020 Alejandro Cosimo, Federico J. Cavalieri, Alberto Cardona, and Olivier Brüls. On the adaptation of local impact laws for multiple impact problems. *Nonlinear Dynamics*, 102(4):1997–2016, November 2020.

2020 Javier Galvez, Federico J. Cavalieri, Alejandro Cosimo, Olivier Brüls, and Alberto Cardona. A nonsmooth frictional contact formulation for multibody system dynamics. *International Journal for Numerical Methods in Engineering*, May 2020.

2019 Alejandro Cosimo, Javier Galvez, Federico J. Cavalieri, Alberto Cardona, and Olivier Brüls. A robust nonsmooth generalized-α scheme for flexible systems with impacts. *Multibody System Dynamics*, 48(2):127–149, July 2019.

2018 Alejandro Cosimo, Alberto Cardona, and Sergio Idelsohn. Global-Local HROM for non-linear thermal problems with irreversible changes of material states. *Comptes Rendus Mécanique*, 346(7):539 – 555, 2018.

2017 Alejandro Cosimo, Alberto Cardona, and Sergio Idelsohn. Global-Local ROM for the solution of parabolic problems with highly concentrated moving sources. *Computer Methods in Applied Mechanics and Engineering*, 326(Supplement C):739 – 756, 2017.

2016 Alejandro Cosimo, Alberto Cardona, and Sergio Idelsohn. General treatment of essential boundary conditions in reduced order models for non-linear problems. *Advanced Modeling and Simulation in Engineering Sciences*, 3(1):1–14, 2016.

2014 Alejandro Cosimo, Alberto Cardona, and Sergio Idelsohn. Improving the k-compressibility of hyper reduced order models with moving sources: Applications to welding and phase change problems. *Computer Methods in Applied Mechanics and Engineering*, 274(0):237 – 263, 2014.

2013 Alejandro Cosimo, Víctor Fachinotti, and Alberto Cardona. An enrichment scheme for solidification problems. *Computational Mechanics*, 52(1):17–35, 2013.

2011 Lisandro D. Dalcin, Rodrigo R. Paz, Pablo A. Kler, and Alejandro Cosimo. Parallel distributed computing using python. *Advances in Water Resources*, 34(9):1124 – 1139, 2011.

Publications in preparation

Towards a mortar formulation for frictionless contact between beams with circular cross-sections: a mortar formulation for line-line contact of beams is proposed.

About the nonsmooth generalized-α method (NSGA) and contact constraints at acceleration level: contact constraints at acceleration level are studied in the context of the NSGA.

The adoption of iterative solvers for the simulation of nonsmooth multibody systems and the issue of the bilateral constraints: the use of iterative solvers (Gauss-Seidel) for solving the dynamics of nonsmooth multibody systems is explored in the context of the NSGA scheme. The difficulty of imposing bilateral constraints without any drift is studied.

Extended list of publications

For an extended list of publications and CV follow this link