

## Highlights

- Expert in topology optimization and the finite element method. Wide experience in high performance numerical computing and software development in Python and C++

## Experience

- **Corintis SA** Lausanne, Switzerland  
*Thermal Modeling and Simulation Engineer* *March 2022 – Present*
  - Developing a topology optimization framework for the cooling of power electronics circuits.
- **Lawrence Livermore National Laboratory** Livermore, CA  
*Postdoctoral Researcher* *May 2019 – March 2022*
  - Developed a Python topology optimization library using the level set method.
  - Developed a design framework for heat exchangers and supercapacitors.
  - Built a web application using Flask and Signac for the post-processing of topology optimization results.
  - Validated supercapacitor models with experiments.
  - Mentored summer intern to conduct experimental validation of supercapacitor models.
  - Provided training to colleagues starting in the field of topology optimization.
  - Provided guidelines for software development of future in-house topology optimization codes
- **Lawrence Livermore National Laboratory** Livermore, CA  
*Research Assistant* *Sep. 2015 – April 2019*
  - Developed a large-scale topology optimization framework for solid mechanics in C++. Build system with CMake and Continuous Integration with Bamboo.
  - Implemented adaptive mesh refinement in topology optimization with goal oriented error measures.
  - Simulation and experimental validation of an electrophoretic deposition flow cell.
  - Implemented mesh independent optimization algorithms for PDE-constrained problems.
  - Participated in the discussions for the development of in-house optimization framework.
- **ExxonMobil** Houston, TX  
*Computational Scientist* *May. 2015 – August 2015*
  - Performed numerical simulations on fully developed turbidity currents velocity profiles. Implemented a  $k-\epsilon$  turbulent model to solve the Reynolds-Averaged Navier Stokes Equations.
- **University of Illinois at Urbana-Champaign** Champaign, IL  
*Research Assistant* *May. 2012 – May 2015*
  - Material design optimization for energy wave management. Implementation of an adaptive discrete adjoint Runge-Kutta method in C++.

## Education

- **University of Illinois at Urbana-Champaign** Champaign, IL  
*PhD and MS in Mechanical Engineering; GPA:3.89* *January. 2011 – May 2019*
  - PhD thesis on Adaptive Mesh Refinement applied to topology optimization.
  - MS thesis on optimization of granular materials for energy wave management using an adaptive discrete adjoint method.
- **University of Granada** Granada, Spain  
*Bachelor in Civil Engineering;* *October. 2004 – December. 2010*

## Honors and Awards

Livermore Graduate Scholar for graduate studies

*September 2015*

TALENTIA fellowship for graduate studies

*December 2011*

## Scientific Service

Reviewer for Structural and Multidisciplinary Optimization (2019 - Present)

Reviewer for Computer Methods Computer Methods in Applied Mechanics and Engineering (2019 - Present)

Minisymposium organizer MS142 New Developments in Shape and Topology Optimization SIAM CSE 2021, Virtual Conference, March 1 - 5, 2021.

Minisymposium organizer MS132 and MS166 Latest Advances in Topology and Shape Optimization SIAM CSE 2019, Spokane, Washington, USA, February 25 - March 1, 2019.

## Publications

- Roy T., Salazar de Troya M.A., Worsley M.A., Beck V.A. “Topology optimization for the design of porous electrodes”, submitted to Structural and Multidisciplinary Optimization, 2021
- Salazar de Troya M.A., Tortorelli D.A., Beck V.A. “Three-dimensional topology optimization of heat exchangers with the level-set method.”, submitted to Computer Methods in Applied Mechanics and Engineering, 2021
- Salazar de Troya M.A., Oxberry G.M., Petra C.G., Tortorelli D.A. “Another source of mesh dependence in topology optimization”, in review at Computer Methods in Applied Mechanics and Engineering, 2021
- C. G. Petra, M. Salazar De Troya, N. Petra, Y. Choi, G. M. Oxberry, and D. Tortorelli, “A quasi-Newton interior-point method for optimization in Hilbert spaces”, in review at SIAM J. On Sci. Comp., 2021.
- Salazar de Troya M.A., Morales, J.R., Giera B.; Pascall A.J., Worsley M.A., Landingham, R., Du Frane W.L., Kuntz J.D. “Modeling flow-based electrophoretic deposition for functionally graded materials”, Materials & Design 209, 110000 2021
- Salazar de Troya M.A., Tortorelli D.A. “Three dimensional adaptive mesh refinement in stress constrained topology optimization”, Structural and Multidisciplinary Optimization 62 (5), 2467-2479, 2020
- Salazar de Troya M.A., Tortorelli D.A. “Adaptive mesh refinement in stress-constrained topology optimization”, Structural and Multidisciplinary Optimization 58 (6) 2369-2386 2018

## Conference presentations

- Salazar de Troya M.A., Tortorelli D.A., Beck V.A. “Two-Dimensional Topology Optimization of Heat Exchangers with the Density and Level-Set Methods.” 14th WCCM-ECCOMAS Congress 2020. Vol. 1300. January 2021.
- Salazar de Troya M.A., Tortorelli D.A., Beck V.A. “Two-Dimensional Topology Optimization of Heat Exchangers with the Density and Level-Set Methods.” SIAM CSE Congress 2021. March 1-5.
- Salazar de Troya M.A., Tortorelli D.A., “Stress constrained topology optimization with the CutFEM method, SIAM CSE 2019, Spokane, Washington, USA, February 25 - March 1, 2019.

- Salazar de Troya M.A., Tortorelli D.A., “Truss lattice design under dynamic loads with adaptive time stepping”, 6th International Conference on Engineering Optimisation, Lisbon, Portugal, 17 - 19 September 2018.
- Salazar de Troya M.A., Tortorelli D.A., “Three dimensional adaptive mesh refinement topology optimization”, 12th World Congress of Structural and Multidisciplinary Optimisation Braunschweig, Germany, 5 - 9 June 2017.
- Salazar de Troya M.A., Tortorelli D.A., “Adaptive mesh refinement in stress-based topology optimization with goal-oriented constraints”, 4th International Conference on Engineering Optimization, Lisbon, Portugal, Sept 8 - 11, 2014.
- Salazar de Troya M.A., Tortorelli D.A. “Optimization in bead packing with elastoplastic behavior”, 10th World Congress on Structural and Multidisciplinary Optimization, Orlando, Florida, May 19 - 24, 2013