Leobardo Valera | Mathematician and Computational Scientist

Location: **El Paso, USA**
Telephone: **(915) 267-7564**
Email: **leobardovalera@gmail.com**

Professional Profile

My early passion for Mathematics is not a question to any of my family members and friends. This passion has evolved into computational research over years and has provided me the means to collaborate in a handful of outstanding multidisciplinary research projects among which ARL research project within Stanford Army High-performance Computing Research Center (AHPCR) on reduced-order modeling for large-scale numerical simulations stands out. My contribution to this research project was to develop and implement new algorithms to handle uncertainty in the process of model-order reduction. I have presented the result of my research projects in over 22 conferences worldwide.

Several years of lecturing classes in Spanish and English have been very rewarding and has helped me connect and interact with a wide spectrum of students with versatile backgrounds.

Core Skills

Technicals:

- Strong Mathematical foundations: Machine learning (Neural Network, TensorFlow, Random Forest, KNN),
- Proficient in Matlab, C, and Python,
- Parallel Computiong (MPI),
- Strong Mathematical foundations: Numerical Linear Algebra. Sparse Matrices Operations,
- Strong Mathematical foundations: Quantum Computing,
- Proficient handling uncertainty in nonlinear dynamical systems,
- Solid knowledge in Data Analysis and Machine Learning,
- Strong Mathematical foundation skills: logic, abstract thinking, and problem solving.

Communication:

- Used to present research to a wide audience,
- Writing articles,
- Collaborating in writing proposal,
- Fluent (oral and written) in English and Spanish.

Managing:

- Managing research students teams,
- Teaching classes up to 45 students,
- Co-leading in research programs.

Education

Degree	Institution	Date
Ph.D in Computational Sciences	The University of Texas at El Paso	May 2018
Master in Computational Sciences	The University of Texas at El Paso	Dec 2015
Master in Mathematics	Universidad Central de Venezuela	Nov 2002
Bachelor in Mathematics	Universidad Central de Venezuela	Apr 1996

Certifications

Certificate	Program	Date
Python Data Analysis	National Association of State Boards of Accountancy (NASBA) — Registry ID: #140940	Jul 2022

Employment History

1. **Aug 2018 - Present:** Partner, data analyst and **technical director at Kempem.**

   Responsibilities: Measuring and analyzing twenty attributes of entrepreneurial competence grouped in 3 dimensions (knowledge, skills and attitudes and values); potential entrepreneur's level of maturity its correlation with the entrepreneurship execution in which the individual or his/her team is located.

2. **Jan. 2022 - Present:** Adjunct professor. Department of Mathematics at The University of Texas at El Paso.

3. **Jan. 2020 - Dec 2021:** Postdoctoral Researcher. Department of Electrical Engineering and Computer Science at the University of Tennessee Knoxville, Knoxville, Tennessee, USA.

   Responsibilities: I conduct full-time, hands-on independent research on various cyberinfrastructure tools for precision agriculture in the 21st century. Tasks include performing tests by using existing tools and extending the tool suite with a surrogate based model.

   Reproducibility in Computational and Data-Enabled Science-Paradigms, Practices, and Infrastructure. Research to ensure that computational results -such as those from simulations- are "reproducible", that is, the same results are obtained when one re-uses the same input data, methods, software and analysis conditions.

4. **Sep. 2018 - Dec. 2019:** Adjunct Instructor. The University of Texas at El Paso, El Paso, Texas, USA.

5. **Jan. 2013 - Sept. 2018:** Researcher Assistant. Theoretical Research and Applications in Computer Sciences (TRACS) in the College of Sciences at The University of Texas at El Paso, El Paso, Texas, USA.

6. **Apr. 1999 - Dec. 2012:** Associative Professor. Universidad Metropolitana, Caracas, Venezuela.

7. **Apr. 1992 - Apr. 1999:** Adjunct Instructor. Universidad Central de Venezuela, Caracas, Venezuela.

Honors and Awards

1. Graduate Award for Academic and Research Excellence in Computational Science. UTEP, May 2018.

2. Graduate Award for Academic and Research Excellence in Computational Science. UTEP, December 2015.

3. Banner Bearer at UTEP's Winter 2015 Commencement.

4. Outstanding Paper Award. Joint Annual Conference of the North American Fuzzy Information processing Society NAFIPS'2015 and 5th World Conference on Soft Computing. *Model reduction: why it is possible and how it can potentially help to control swarms of Unmanned Aerial Vehicles (UAVs)*

5. Outstanding Paper Award. Joint Annual Conference of the North American Fuzzy Information processing Society NAFIPS'2015 and 5th World Conference on Soft Computing. *How to speed up software migration and modernization.*

6. Young Investigator Award. Universidad Metropolitana, 2002.

Conference Organization and Chairing of Program Committees

1. Editor in chief's assistant Reliable Computing (Interval Computations) Journal.

2. Part of the organizer team of Building Pathways to Grad school: a Google-sponsored workshop.

3. Chair of session *Optimization Challenges in Modeling*, Informs Annual Meeting 2016.

4. Local Organizing Committee of NAFIPS'2016 (nafips.cs.utep.edu)

5. Publication Committee of NAFIPS'2016 (nafips.cs.utep.edu)

Publications

Journal Publications

1. Ricardo Llamas, Leobardo Valera, Paula Olaya, Michela Taufer, and Rodrigo Vargas *Downscaling Satellite Soil Moisture using a Modular Spatial Inference Framework*, Remote Sensing in Geology, Geomorphology and Hydrology. https://www.mdpi.com/2072-4292/14/13/3137

2. Clariandys Rivera-Kempis, Leobardo Valera, and Miguel Angel Sastre-Castillo *Entreprenurial Competence: Using Machine Learning to Classify Entrepreneurs.* Sustainability 2021, 13, 8252. https://doi.org/10.3390/su13158252

3. Valera, Leobardo, Martine Ceberio, and Vladik Kreinovich. "Why Burgers Equation: Symmetry-Based Approach." In Decision Making under Constraints, pp. 211-216. Springer, Cham, 2020.

4. Valera, Leobardo, Martine Ceberio, and Vladik Kreinovich. "Derivation of Louisville-Bratu-Gelfand Equation from Shift-or Scale-Invariance." In International Fuzzy Systems Association World Congress, pp. 813-819. Springer, Cham, 2019.

5. Cervantes, Fernando, Bryan Usevitch, Leobardo Valera, and Vladik Kreinovich. "Why sparse? Fuzzy techniques explain empirical efficiency of sparsity-based data-and image-processing algorithms." In Recent Developments and the New Direction in Soft-Computing Foundations and Applications, pp. 419-428. Springer, Cham, 2018.

6. Leobardo Valera and Martine Ceberio. *Model-Order Reduction Using Interval Constraint Solving Technique.* Journal of Uncertainty Systems, Vol. 11, 2017.

Peer Review Conference Publications

11. Valera, Leobardo, Martine Ceberio, and Vladik Kreinovich. "How to Select a Representative Sample for a Family of Functions?." Proceedings of the 15th International Workshop on Constraint Programming and Decision Making CoProD'2022, Halifax, Nova Scotia, Canada, May 30, 2022.

10. Leobardo Valera, Martine Ceberio, Olga Kosheleva, Vladik Kreinovich (2022) Equations for Which Newton's Method Never Works: Pedagogical Examples. In: Bede B., Ceberio M., De Cock M., Kreinovich V. (eds) Fuzzy Information Processing 2020. NAFIPS 2020. Advances in Intelligent Systems and Computing, vol 1337. Springer, Cham. `https://doi.org/10.1007/978-3-030-81561-5_36`

9. Omeiza Olumoye, Glen Throneberry, Angel Garcia, Leobardo Valera, Abdessattar Abdelke, and Martine Ceberio, *Solving Large Dynamical Systems by Constraint Sampling*, Workshop on Engineering Applications – WEA 2019: Applied Computer Sciences, October 16-18, 2019, Santa Marta, Colombia.

8. Leobardo Valera, Martine Ceberio, and Vladik Kreinovich. *Derivation of Louisville-Bratu-Gelfand Equation from Shift- or Scale-Invariance.* The 12th International Workshop on Constraint Programming and Decision Making (CoProD 2019) June 17, 2019 - Lafayette, Louisiana.

7. Leobardo Valera, Angel Garcia, and Martine Ceberio. *"On-the-fly" parameter identification for dynamic systems control, using interval computations and reduced-order modeling.* North American Fuzzy Information Processing Society Annual Conference. Cancun, Mexico, 2017

6. Leobardo Valera, Angel Garcia, Afshin Gholamy, and Martine Ceberio. *Towards Predictions of Large Dynamic Systems' Behavior using Reduced-Order Modeling and Interval Computations.* IEEE International Conference on Systems, Man, and Cybernetics (SMC2017). Banff, Canada, 2017.

5. Leobardo Valera and Martine Ceberio. *Using Interval Constraint Solving Techniques to Better Understand and Predict Future Behaviors of Dynamic Problems?*, Proceedings of NAFIPS 2016.

4. Leobardo Valera and Martine Ceberio, *Model-Order Reduction Using Interval Constraint Solving Techniques*, Proceedings of 7th International Workshop on Reliable Engineering Computing (REC 2016), Ruhr Germany, Jun 2016.

3. F. Cervantes, B. Usevitch, L. Valera, V. Kreinovich and O. Kosheleva, "Fuzzy techniques provide a theoretical explanation for the heuristic lp regularization of signals and images," 2016 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), 2016, pp. 1323-1327, doi: 10.1109/FUZZ-IEEE.2016.7737842.

2. Martine Ceberio, Leobardo Valera, Olga Kosheleva, and Rodrigo Romero, *Model reduction: why it is possible and how it can potentially help to control swarms of Unmanned Aerial Vehicles (UAVs)*, Joint Annual Conference of the North American Fuzzy Information processing Society NAFIPS'2015 and 5th World Conference on Soft Computing, Redmond, Washington, August 17-19, 2015. Outstanding Paper Award. Joint Annual Conference of the North American Fuzzy Information processing Society NAFIPS'2015 and 5th World Conference on Soft Computing

1. Francisco Zapata, Octavio Lerma, and Leobardo Valera. *How to speed up software migration and modernization*, Joint Annual Conference of the North American Fuzzy Information processing Society NAFIPS'2015 and 5th World Conference on Soft Computing, Redmond, Washington, August 17-19, 2015. Outstanding Paper Award. Joint Annual Conference of the North American Fuzzy Information processing Society NAFIPS'2015 and 5th World Conference on Soft Computing

Conferences

Oral Presentations

22. Leobardo Valera, Ricardo Llamas, Rodrigo Vargas, and Michela Taufer, *Adopting and Adapting High Performance Computing Tools for Soil Moisture Modelling.* 31th Innovative Computing Laboratory and Global Computing Laboratory (ICL/GCL) Retreat, August 13th – 14th, 2020.

21. Omeiza Olumoye, Glen Throneberry, Angel Garcia, Leobardo Valera, Abdessattar Abdelke, and Martine Ceberio, *Solving Large Dynamical Systems by Constraint Sampling.* 25th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences. El Paso, TX, November 2019.

20. Omeiza Olumoye, Martine Ceberio, and Leobardo Valera, *Why Intervals? A Survey of cases Showing the Advantages of Using Intervals in Parameters Estimation in Dynamical Systems.* 25th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences. El Paso, TX, November 2019.

19. Leobardo Valera, Eduardo Saenz de Cabezon, and Martine Ceberio, *Surviving a Zombie Attack Using Interval Constraint Solving Techniques. A Fun approach to a Serious Problem. Epidemics.* 23th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences. El Paso, TX, November 2018.

18. Leobardo Valera, *Towards Predicting the Behavior of Large Dynamic Systems, using Reduced? Order Modeling and Interval Computations*, West Texas Applied Math Graduate Minisymposium 2, Lubbock, TX. April, 2018

17. Leobardo Valera and Martine Ceberio *Reliable Evaluation of the L2-Norm of a Stable Linear Filter Using Interval Constraints Solving Techniques.* 21st Joint UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Sciences, El Paso, 2017.

16. Leobardo Valera, Jesus Padilla and Martine Ceberio *RELIABLE-EIG: An Algorithm to Compute the Spectrum of a Non-Defective Matrix Using Interval Constraints Solving Techniques.*Constraint Programming and Decision Making (CoProD 2017), El Paso, 2017.

15. Leobardo Valera and Martine Ceberio *Reliable Evaluation of the L2-Norm of a Stable Linear Filter Using Interval Constraints Solving Techniques.*Constraint Programming and Decision Making (CoProD 2017), El Paso, 2017.

14. Leobardo Valera and Martine Ceberio. *Interval Constraint Solving Techniques and Model-Order Reduction to Enhance the Solution of Dynamic Systems.* INFORMS Annual Meeting. Nashville 2016.

13. Leobardo Valera and Martine Ceberio. *Interval Constraint Solving Techniques and Model-Order Reduction to Enhance the Solution of Dynamic Systems.* 19th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences. El Paso, TX, November 2016.

12. Leobardo Valera and Martine Ceberio. *Large Numerical Simulations: Needs, Challenges, Current Solutions How can Interval Computations help?* NAFIPS 2016.

11. Leobardo Valera and Martine Ceberio. *Reduced Interval Newton Method*, 18th Joint UTEP/NMSU Workshop on Mathematics, Computer Science and Computational Sciences, New Mexico State University, Las Cruces, New Mexico, March 2016.

10. Leobardo Valera and Martine Ceberio. *Using Interval Constraint Solving Techniques in Dynamic Systems Behavior Prediction*, Constraint Programming and Decision Making (COPROD 2015), The University of Texas El Paso, November 2015.

9. Leobardo Valera and Martine Ceberio. *Using Interval Constraint Solving Techniques in Dynamic Systems Behavior Prediction*, 17th Joint UTEP/NMSU Workshop on Mathematics, Computer Science and Computational Sciences The University of Texas, November 2015.

8. Leobardo Valera and Martine Ceberio. *Using Regularization to Improve the Rate of Convergence in a Model-Order Reduction (MOR) Problem.* Presented at the 22th International Symposium on Mathematical Programming. Pittsburg, Pennsylvania, ISMP'2015, July 2015.

7. Leobardo Valera and Martine Ceberio. *Using Regularization to Improve the Rate of Convergence in a Model-Order Reduction (MOR) Problem.* The 16th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences. New Mexico State University, Las Cruces, New Mexico, April 11, 2015.

6. Leobardo Valera and Martine Ceberio. *Model-Order Reduction Using Cubic Spline Curve-Fitting.* UTEP Graduate Student Expo. The University of Texas at El Paso, November 2014.

5. Leobardo Valera and Martine Ceberio. *Model-Order Reduction Using Cubic Spline Curve-Fitting.* 15th Joint UTEP/NMSU Workshop on Mathematics, Computer Science and Computational Sciences. The University of Texas at El Paso, November 2014.

4. Leobardo Valera, Miguel Argáez y Brígida Molina *Diferentes técnicas de precondicionamiento para el método PPCG en optimización con restricciones.* VIII Congreso de investigación creación intelectual. Universidad Metropolitana, Caracas, Venezuela, 2012.

3. Leobardo Valera, Miguel Argáez, and Brígida Molina *Diferentes técnicas de precondicionamiento para el método PPCG en optimización con restricciones.* XI Congreso Internacional de Métodos Numérico en Ingeniería y Ciencias Aplicadas, Isla de Margarita, Venezuela 2012.

2. Leobardo Valera, Miguel Argáez, and Brígida Molina *Diferentes técnicas de precondicionamiento para el método PPCG en optimización con restricciones.* XVIII Congreso Colombiano de Matemáticas, Bucaramanga, Colombia, 2011.

1. Leobardo Valera and Brigida Molina, *LSQR Method Acceleration Using a Simulated LU Factorization.* VII Pan-American Workshop Applied & Computational Mathematics, Choroni, Venezuela, 2010.

Poster Presentations

7. Leobardo Valera, Jesus Padilla, and Martine Ceberio. *Uncertainty Quantification in Dynamic Systems with Applications to Combustion-related Problem.* Army High Performance Computing Research Center (AHPCRC), Annual Technical Review Meeting Stanford University, Santa Cruz, CA USA. March 2018.

6. Leobardo Valera and Martine Ceberio. *How to use Constraint Solving Techniques (ICST) to Predict Future Behaviors of Dynamic Problems.* Army High Performance Computing Research Center (AHPCRC), Annual Technical Review Meeting Stanford University, Santa Cruz, CA USA. March 2016.

5. Leobardo Valera and Martine Ceberio. *Handling Uncertainty and Large Dimensions in Nonlinear Systems of Equations using Interval Constraint Solving Techniques (ICST).* Army High Performance Computing Research Center (AHPCRC), Annual Technical Review Meeting Stanford University, Santa Cruz, CA USA. March 2016.

4. Leobardo Valera, Martine Ceberio, and Horacio Florez, *Handling Uncertainty and Large Dimensions in Nonlinear Systems of Equations using Interval Constraint Solving Techniques* Army High Performance Computing Research Center, Research Management Boarding Meeting, Stanford, CA, January 2016.

3. Cristian Ayub, Gabriel Felix, Elsa Gonzalez-Aguilar, Raul Mena, Leobardo Valera, and Martine Ceberio *Introduction to Pairwise Testing. Definition and Examples*, 17th Joint UTEP/NMSU Workshop on Mathematics, Computer Science and Computational Sciences The University of Texas, November 2015.

2. Luis Gutierrez, Leobardo Valera, and Martine Ceberio. *Validated Solutions of ordinary Differential Equations and Prediction of Behavior.* 15th Joint UTEP/NMSU Workshop on Mathematics, Computer Science and Computational Sciences The University of Texas

1. Martine Ceberio, Miguel Argaez, Reinaldo Sanchez, and Leobardo Valera. *Using Wavelet Transformations for Reduced-Order Modeling.* Army High Performance Computing Research Center (AHPCRC), Annual Technical Review Meeting Stanford University, Santa Cruz, CA USA. August 2014.