IRINA KALASHNIKOVA TEZAUR, PH.D.

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EDUCATION AND TRAINING

University of Pennsylvania	Mathematics	B.A.	2006
University of Pennsylvania	Mathematics (Advisor: Prof. A. Kirillov)	M.A.	2006
Stanford University	Computational & Mathematical Engineering (Advisor: Prof. C. Farhat)	Ph.D.	2011

PROFESSIONAL APPOINTMENTS

Graduate Research Assistant	Stanford University	2006—2011
Graduate Technical Intern (Year-Round)	Sandia National Laboratories Aerosciences Department	2007—2011
Senior Member of Technical Staff	Sandia National Laboratories Computational Mathematics Department	2011—2014
Principal Member of Technical Staff	Sandia National Laboratories Quantitative Modeling & Analysis Department	2015—2021
Distinguished Member of Technical Staff	Sandia National Laboratories Quantitative Modeling & Software Engineering Department	2021—present

HONORS AND AWARDS

- Recipient of Robert J. Melosh Medal for Best Paper in Finite Element Analysis (2008).
- 2 Fellowships: U.S. Department of Defense National Defense Science & Engineering Graduate (NDSEG) Fellowship (2007—2010), National Physical Science Consortium (NPSC) Graduate Fellowship (2010-2011)
- Recipient of Sandia National Laboratories' Early Career Laboratory Directed Research & Development (LDRD) award (2012)
- Sandia National Laboratories' Public Good Innovator Award for Albany 2.0, an open-source multi-physics finite element code (2014)
- 3 Sandia National Laboratories' SPOT Awards (2012, 2019, 2025)
- 2 Sandia National Laboratories' Employee Recognition Awards (ERA) (2012, 2016)
- Recipient of Presidential Early Career Award for Scientists and Engineers (PECASE) for "developing new, impactful mathematical methods and computer algorithms to enable real-time analysis, control,

and decision-making on computationally prohibitive problems relevant to nuclear security mission and climate modeling" (2019)

- Nominated for/promoted to full membership of Sigma Xi Scientific Research Honor Society for noteworthy achievements as an original investigator (2019)
- Nominated by Sandia National Laboratories' Director Dr. James Peery for the 2021 Blavatnik Award for Young Scientists (2020)
- Awarded a Simons Fellowship to visit the Isaac Newton Institute as part of "Mathematical & Statistical Foundation of Future Data-Driven Engineering" workshop held during winter/spring 2023.

CURRENT AND PAST RESEARCH SUPPORT/PROJECT LEADERSHIP

- **Principal Investigator.** Sandia National Laboratories Laboratory Directed Research & Development (LDRD) Award, "Reduced Order Modeling for Prediction & Control of Large-Scale Systems", $470K, 2012—2014.
- **Technical Lead.** Sandia National Laboratory Directed Research & Development (LDRD) Award, "The Aeras Next Generation Global Atmosphere Model", $1.8M, 2013—2016.
- **Principal Investigator.** Sandia National Laboratories Advanced Simulation & Computing (ASC) Program, "Model Reduction for Compressible Cavity Simulations Towards Uncertainty Quantification of Structural Loading", $785K, 2014—2018.
- **Performance Lead.** Department of Energy (DOE) SciDAC4 (BER + ASCR), "Probabilistic Sea-Level Projections from Ice Sheet and Earth System Models (ProSPect)", $3.275M, 2017—2022.
- **Technical Lead: Global Sensitivity Analysis.** Sandia National Laboratories Directed Research & Development (LDRD), Earth Science Research Foundation, "Arctic Tipping Points Triggering Global Change", $1.3M, 2017—2020.
- **Verification Lead.** Department of Energy (DOE) Biological and Environmental Research (BER), "Climate Model Development and Verification (CMDV) Software", $5.4M, 2018—2020.
- **Principal Investigator.** U.S. Department of Energy Presidential Early Career Award for Scientists and Engineers (PECASE) Award, $250K, 2019—2023.
- **Technical Lead: Simulation-Driven Anomaly Detection Methods.** Department of Energy (DOE) Office of Science Advanced Scientific Computing Research (ASCR), Base Computer Science, "In-Situ Machine Learning for Exascale Platforms", $2.4M, 2020—2024.
- **Technical Lead.** Sandia National Laboratories Grand Challenge Laboratory Directed Research & Development (LDRD), "CLDERA - CLimate impact: Dynamically tRacEd Attribution**",** $15M, 2021—2024.
- **Co-Principal Investigator.** Sandia National Laboratories Laboratory Directed Research & Development (LDRD), Computing and Information Sciences (CIS) Research Foundation, "Rigorous and agile coupling of conventional and data-driven models for heterogeneous multi-physics, multi-scale simulations", $1.732M, 2021—2024.
- **Sandia Principal Investigator.** National Nuclear Security Administration (NNSA) Minority Serving Institutions Partnership Program (MSIPP), "The Rio Grande Consortium for Advanced Research on Exascale Simulation (Grande CARES)", $927K, 2022—2027.
- **Sandia Principal Investigator.** Department of Energy (DOE) Office of Science (SC) Advanced Scientific Computing Research (ASCR) Mathematical Multifaceted Integrated Capability Centers (MMICCs), "M2dt: Multifaceted Mathematics for Predictive Digital Twins", $2.5M, 2022-2027
- **Principal Investigator.** Sandia National Laboratories Laboratory Directed Research & Development (LDRD), Engineering Science Research Foundation (ESRF), "Accelerating the analyst workflow: adaptive hybrid models via domain decomposition", $2.229M, 2024—2027.

- **Thrust Lead.** Department of Energy (DOE) Office of Science (SC) Advanced Scientific Coputing Research (ASCR) Competitive Portfolios for Advanced Scientific Computing Research, "ASCEND: Applied mathematics and Scientific Computing Ecosystem for the New Digital era", $11.2M, 2024-2027.

PENDING RESEARCH SUPPORT

SCIENTIFIC LEADERSHIP AND PROFESSIONAL SERVICE

- Invited review Panelist for National Defense Science & Engineering Graduate (NDSEG) Fellowship (2014).
- Conference organizer/scientific committee member for 14 conferences/workshops (ICCS 2015, SIAM GS 2017, ESCO 2018, ESCO 2020, PASC 2021, ESCO 2022, ESCO 2024, MORe 2024, LSSC 2025, AIDT4ES 2025, ESCO 2026, MORe 2026, COUPLED 2027, PANACM 2027).
- Invited selection committee member for Sandia National Laboratories' prestigious John von Neumann Fellowship in Computational Science (2018—present).
- Invited member of judging panel for student paper/poster competition at the World Congress on Computational Mechanics (WCCM) 2018.
- Invited member of SIAM Geosciences Prize committee (2019).
- By invitation, served "Opponent" role in Ph.D. thesis defense at Uppsala University (2019).
- Reviewer/judge for 2020 Society of Women Engineers (SWE) 2020 Freshman Scholarship.
- Invited member of scientific advisory board for 6-month program to be held at the Isaac Newton Institute entitled "The Mathematical & Statistical Foundation of Future Data-Driven Engineering" (2020).
- Invited panel member for AIAA SciTech 2021 technical panel entitled "Data-Driven Modeling for Complex Fluid Physics".
- Organizer of 50+ conference minisymposia worldwide (SIAM CS&E 2015, ICCS 2015, ICIAM 2015, SIAM UQ 2016, SIAM MPE 2016, SIAM CS&E 2017, FEF 2017, SIAM Geosciences 2017, ESCO 2018, WCCM 2018, SIAM CS&E 2019, ICIAM 2019, ESCO 2020, SIAM AN 2020, SIAM CSE 2021, PASC 2021, SIAM GS 2021, SIAM UQ 2022, ESCO 2022, SIAM MPE 2022, WCCM 2022, SIAM CS&E 2023, CFC 2023, COUPLED 2023, SIAM GS 2023, USNCCM 2023, SIAM UQ 2024, ECCOMAS 2024, ESCO 2024, WCCM 2024, JMM 2025, CFC 2025, COUPLED 2025, LSSC 2025, USNCCM 2025, SIAM UQ 2026, ESCO 2026, WCCM-ECCOMAS 2026, SIAM CSE 2027, DTE 2027, SIAM DS 2027, LSSC 2027, COUPLED 2027, USNCCM 2027) and >10 workshops (including Banff International Research Station, Isaac Newton Institute, Institute for Mathematical & Statistical Innovation, AI & Digital Twins for Earth Systems, ICLR 2027).
- Directly supervised 17 postdocs (including 2 John von Neumann Fellows and 1 Collis Fellow) and 27 students (including from Stanford, Caltech and Columbia).
- Reviewer for ~25 journals (including *Int. J. Numer. Meth. Fluids, Int. J. Numer. Meth. Engng., J. Comput. Phys., J. Comput. Appl. Math., AIAA J., J. Fluid Mechanics, Comput. Meth. Appl. Mech. Engng., J. Geoscientific Model Dev., Nature Climate Change, J. Sci. Comput, SISC, Comp. Mech., Proc. R. Soc. A*, *Computers & Structures, Engng. Reports, Appl. Math. Model., Int. J. Heat Mass Transfer*)
- Book reviewer for World Scientific Publishing Company.
- Creator of Albany Land Ice (ALI) model, currently the land-ice component of the Department of Energy's Energy Exascale Earth System Model (E3SM).

- Proposal reviewer for the Platform for Advanced Computing (PASC) and Sandia National Laboratories' LDRD program.
- Co-organizer of breakout session entitled "Coastal dynamics, Ocean and Ice" at the Artificial Intelligence for Earth System Predictability (AI4ESP) workshop series sponsored by the DOE's Office of Biological and Environmental Research (BER).
- Selection committee chair for 2022 SIAG/MPE Prize and SIAG/MPE Early Career Prize.
- Society for Industrial and Applied Mathematics (SIAM) Geosciences Activity Group Secretary for the 2023-2025 term (by nomination and SIAM general election).
- SIAM Mathematics of Planet Earth (MPE) Activity Group Vice Chair for the 2023-2025 term (by nomination and SIAM general election).
- Reviewer of student presentations at the at 22nd IACM ComputationL Fluids Conference (CFC) 2023, Cannes, France. April 25-28, 2023.
- Founding member and chair of U.S. Association for Computational Mechanics (USACM) Energy and Earth Systems Technical Thrust Area for 2023-2026 term.
- Reviewer for AI4DifferentialEquations In Science International Conference on Learning Representations (ICLR) 2024 Workshop.
- Ph.D. dissertation defense committee member for Giulia Sambataro (University of Bordeaux/INRIA), Joshua Barnett (Stanford University), Ian Moore (Virginia Tech) and Sidharth Menon (Worcester Polytechnic Institute).
- Invited member of the Industrial Advisory Board (IAB) for the Mechanical Engineering Department at Texas A&M Kingsville.
- Invited member of 2025 SIAM Germund Dahlquist Prize Selection Committee.
- Invited member of 2027 SIAM James H. Wilkinson Prize for Numerical Software selection committee.
- Invited member of the Program Committee in the Applications, Algorithms and Libraries track for IEEE CLUSTER 2026
- Invited member of Nominating Committee for the 2027-2028 SIAG/CSE Activity Group Officers.

EDITORIAL ROLES/BOARDS

- Associate Editor of IEEE's Computing in Science & Engineering (CiSE) Technical Magazine (by nomination).
- Guest editor for special issue of the Journal of Computational & Applied Mathematics (JCAM) devoted to contributions from the European Seminar on COmputing (ESCO) 2022 and the European Seminar on COmputing (ESCO) 2024.
- Co-editor of several special issues of Computing in Science & Engineering (CiSE): Special Issue on the Future of Research Software Engineers in the United States—Part I (Volume 24, Issue 5), Special Issue on the Future of Research Software Engineers in the United States—Part II (Volume 24, Issue 6), Special Issue on Computational Modeling of Ice Sheets and Glaciers (Volume 25, Issue 3), and Special Issue on Contributions from the European Seminar on COmputing (ESCO) 2024.
- Editorial Advisory Board Member for the International Journal for Numerical Methods in Engineering.
- Editorial Board Member for the Finite Elements in Analysis and Design (FINEL) journal.
- Guest editor for special issue of Earth System Dynamics (ESD)/Geoscientific Model Development (GMD) on theoretical and computational aspects of ensemble design, implementation, and interpretation in climate science.

IN-THE-NEWS: FEATURE ARTICLES AND NEWS RELEASES

- "Rapid development of an ice sheet climate application using the components-based approach", *2015 Sandia National Laboratories HPC Annual Report*.
- "Ice sheet modeling of Greenland, Antarctica helps predict sea-level rise", *Sandia Lab News/Sandia Press Release,* Feb. 5, 2016. The article was picked up by the following sources: Space Daily, PhysOrg, Scientific Computing, Eurasia Review, One News Page, Science Codex, Environmental News Network, Observatorio del Plastico, and the National Nuclear Security Administration (NNSA).
- "Addressing Challenges in Reduced-Order Modeling", *SIAM News,* Mar. 1, 2016.
- "NNSA's work and missions help save the earth", *NNSA Highlight*, Apr. 18, 2016.
- "Forecasting, not fearing, sea-level rise", *Clean Technica*, Apr. 28, 2016.
- "Improving ice sheet models through algebraic multigrid methods", *SIAM News*, Oct. 6, 2016.
- Land-Ice modeling performed under the PISCEES project featured in the "Climate" section of the *2017 Sandia National Laboratories' Labs Accomplishment Report.*
- "How to Fit a Planet Inside a Computer: Developing the Energy Exascale Earth System Model", *DOE Office of Science Highlight*, July 12, 2018.
- "Concurrent multiscale coupling in solid mechanics", *2017 Sandia National Laboratories HPC Annual Report.*
- "Simulating Ice at the Bottom of the World: Modeling the Antarctic Ice Sheets", *DOE Office of Science Highlight*, June 12, 2019.
- "President Donald J. Trump Announced Recipients of the Presidential Early Career Award for Scientists and Engineers", *White House Press Release*, July 3, 2019. Additional press releases subsequently issued by the NNSA, Sandia Lab News, SNL's Center 8000, the ABQ journal, the Livermore Independent News, and the Secretary of Energy Rick Perry.
- "Getting to the nuts and bolts of the nuts and bolts", *Sandia Lab News/Sandia Press Release,* Aug. 29, 2019.
- "Sandia in the Arctic: The Arctic Science and Security Initiative Report 2016-2019", Sept. 2019.
- "From Moscow to Livermore: A Sandia Computer Scientist Tells of Her Compelling Journey", *Livermore Independent News,* Oct. 3, 2019.
- "Congressman Swallwell visits Sandia/California", *Sandia Lab News/Sandia Press Release,* Nov. 21, 2019.
- LDRD-funded work highlighted in Sandia's FY19 LDRD Annual Report.
- "Advancing the field of reduced-order modeling" and "Pressio: an HPC library to enable reduced-order modeling", *2020 Sandia National Laboratories HPC Annual Report.*
- The following Nature paper that came out on projected land ice contributions to twenty-first century sea level rise, made using land-ice models which include the MALI model I help to develop under the ProSPect project. The main takeaway is that sea level rise from the melting of polar ice sheets could be halved by 2100 if we meet the Paris Agreement target of limiting global warming to 1.5 degrees C. There are several general audience articles and news releases that discuss the results in the paper (King's College of London News Centre, LANL News Release, NERSC Science News, The New York Times and The Washington Post). May 5, 2021.
- "Scientists Recommend a Multidisciplinary Approach to Predicting Outbreaks", published in a special issue of One Health/One Planet, May 2022.
- "Large-scale PDE-constrained Optimization for Ice Sheet Model Initialization", *SIAM News*, June 1, 2022.
- "New center will develop the mathematical and computational foundations of digital twins for complex energy systems", *UT Austin Oden Institite News*, September 26, 2022.

- "UTEP Receives $1.25M Grant from DOE to Produce Pipeline of Scientists and Engineers: Project Will Focus on Recruiting and Training Scientists and Engineers from Under-represented Groups", *University of El Paso (UTEP) News*, February 6, 2023.
- "Lab mentor program engages minority students, aims to attract STEM hires", *Sandia Lab News/ Sandia Press Release*, August 11, 2023.
- "An innovative HPC approach for modeling Arctic permafrost degradation and coastal erosion", one of 12 articles featured in *2023 Sandia National Laboratories HPC Annual Report*.
- "The U.S. is building an early warning system to detect geoengineering", *New York Times,* November 24, 2024. This article features the inverse attribution capabilities developed under the CLDERA Grand Challenge LDRD project, for which I was a lead.

RESEARCH ADVISING AND MENTORING

Postdoctoral Researchers:

1. *Jeff Fike* (9/2014-9/2016), Ph.D. from Stanford University, currently staff scientist at SNL in the Aerosciences Department.
    - Project: projection-based reduced order models for compressible flow.
2. *Payton Lindsay* (8/2017-4/2018), Ph.D. from Purdue University, currently staff scientist at SNL in the Computational Solid Mechanics & Structural Dynamics Department.
    - Project: projection-based reduced order models for solid mechanics; preconditioned Least Squares Petrov-Galerkin (LSPG) reduced order models.
3. *Jerry Watkins* (1/2018-11/2018), Ph.D. from Stanford University, currently staff scientist at SNL in the Quantitative Modeling & Analysis Department.
    - Project: performance portability of the Albany Land Ice (ALI) model/code to advanced architectures using the Kokkos library and programming model.
4. *Irina Demeshko* (8/2013-1/2016), Ph.D. from Tokyo Institute of Technology, currently Senior Software Engineer at NVIDIA.
    - Project: performance portability of the Albany code base to advanced architectures using the Kokkos library and programming model.
5. *Kookjin Lee* (8/2019-3/2021)*:* Ph.D. from University of Maryland, currently Assistant Professor at Arizona State University.
    - Project: model reduction on nonlinear manifolds using deep convolutional autoencoders.
6. *Eric Parish* (8/2019-6/2020, John von Neumann Postdoctoral Fellow)*:* Ph.D. from University of Michigan, currently staff scientist at SNL in the Extreme Scale Data Science & Analytics Department.
    - Project: windowed least-squares model reduction for dynamical systems; residual-based stabilized reduced order models constructing using discrete and continuous projection
7. *Chad Sockwell* (10/2021-12/2021), Ph.D. from Florida State University, became staff scientist at SNL 1/2022 in the Computational Mathematics Department (deceased as of 4/2022).
    - Project: flexible heterogeneous numerical methods for coupling conventional and data-driven models.
8. *Yukiko Shimizu* (8/2019-7/2022), Ph.D. from University of Michigan.
    - Project: windowed least-squared reduced order models; alternating Schwarz-based coupling of conventional and data-driven models.
9. *Graham Harper* (10/2021-9/2023), Ph.D. from Colorado State University, currently staff scientist at SNL in the Computational Mathematics Department.

- Project: establishing connective source-impact relationships in Earth's climate using novel profiling techniques involving the Energy Exascale Earth System Model (E3SM).

10. *Daria Koliesnikova* (5/2022-8/2023), Ph.D. from CEA Aix-Marseille Université, currently research engineer at CEA (French Alternative Energies and Atomic Energy Commission).
    - Project: developing the Schwarz alternating method for multi-scale mechanical contact simulations.
11. *Hunter Brown* (10/2021-6/2024), Ph.D. from Texas A&M University, currently post doctoral fellow at the University of Wyoming.
    - Project: establishing connective source-impact relationships in Earth's climate using novel simulation strategies of Stratospheric Aerosol Injection (SAI).
12. *Anthony Gruber* (9/2022-09/2024), Ph.D. from Texas Tech University, currently John von Neumann Postdoctoral Fellow at SNL in the Computational Mathematics Department
    - Project: learning operators for structure-informed surrogate models.
13. *Max Carlson* (9/2022-2/2026), Ph.D. from University of Utah, currently staff scientist at SNL in the Quantitative Modeling & Software Engineering Department
    - Projects: performance portability of the Albany Land Ice (ALI) model using the Kokkos library and programming model; discovery of climate source-impact pathways using anomaly detection and clustering methods.
14. *Alejandro Diaz* (7/2024-2/2026), Ph.D. from Rice University, currently S. Scott Collis fellow at SNL in the Machine Intelligence and Visualization Department.
    - Projects: neural network-based reduced order models for fast and accurate large-scale simulations.
15. *Chris Wentland* (2/2023-4/2026), Ph.D. from University of Michigan, currently research staff at Ford Motor Company
    - Projects: developing the Schwarz alternating method as a means for coupling of conventional and data-driven models; developing novel methods for climate attribution.
16. *Elyce Bayat* (1/2024-present), Ph.D. from University of California at Santa Barbara, currently post doctoral fellow at SNL in the Climate Systems Department
    - Projects: development and calibration of the Arctic Costal Erosion (ACE) model.
17. *Giulia Sambataro* (6/2025-present), Post Doctoral Fellow at Friedrich-Alexander-Universität, Erlangen (Germany) and recipient of SIAM Post Doctoral Support Program Fellowship
    - Project: model order reduction for sustainable development: application of physics-based and data-driven methods to environmental problems in climate projection and logistis

Graduate Student Interns:

1. *Jeff Fike* (6/2013-9/2013), Ph.D. from Stanford University, currently staff scientist at SNL in the Aerosciences Department.
    - Project: energy-stable reduced order models for compressible flow.
2. *Syuzanna Sargsyan* (6/2015-8/2015), Ph.D. from University of Washington, currently at HERE Technologies.
    - Project: structure-preserving LSPG model reduction.
3. *Jerry Watkins* (6/2016-1/2018), Ph.D. from Stanford University, currently staff scientist at SNL in the Quantitative Modeling & Analysis Department.
    - Project: performance portability of the Aeras atmosphere model using the Kokkos library and programming model.

4. *Nicolas Morales* (5/2016-8/2016), Ph.D. from University of North Carolina, current staff scientist at SNL in the Scalable Modeling & Analysis Department.
    - Project: performance portability of the Albany/LCM solid mechanics code to next-generation architectures using the Kokkos library and programming model.
5. *Danielle Maddix Robinson* (6/2017-9/2017), Ph.D. from Stanford University, currently at AWS Deep Learning.
    - Project: structure-preserving LSPG model reduction.
6. *Greg Phlipot* (06/2018-09/2018), Ph.D. from California Institute of Technology, currently at Johns Hopkins Applied Physics Laboratory.
    - Project: the Schwarz alternating method for concurrent multi-scale coupling in dynamic solid mechanics.
7. *Xiaoshu Zeng* (06/2018-09/2018), Ph.D. student at University of Southern California, currently Post Doctoral Scholar at University of Southen California.
    - Project: uncertainty quantification for tsunami models.
8. *Zhiheng Wang* (06/2018-09/2018), Ph.D. student at University of Southern California, currently Assistant Professor at Texas Tech University.
    - Project: uncertainty quantification for tsunami models.
9. *Kyle Shen* (1/2020-3/2020), M.S. from Stanford University, currently at Micron Technology.
    - Project: automated performance tracking using changepoint detection algorithms.
10. *Carolyn Kao* (3/2020-6/2020), M.A. student at Stanford University, currently at TSMC.
    - Project: automated parameter tuning for land ice simulations.
11. *Jonathan Hoy* (6/2021-8/2021), Ph.D. student at University of Southern California, currently at Air Force Research Laboratory.
    - Project: developing the Schwarz alternating method for multi-scale mechanical contact simulations.
12. *Max Carlson* (6/2020-8/2022), Ph.D. student at University of Utah, currently post doctoral researcher at Sandia National Laboratories.
    - Project: performance portability of the Albany Land Ice (ALI) model using the Kokkos library and programming model; in-situ anomaly detection.
13. *Joshua Barnett* (6/2022-3/2024), Ph.D. student at Stanford University, currently at Cadence Design Systems.
    - Project: coupling of conventional and data-driven models using the Schwarz alternating method.
14. *Will Snyder* (5/2023-8/2023), Ph.D. student at Virginia Tech, currently R&D Engineer at Align Technology.
    - Project: coupling of conventional models and physics-informed neural networks (PINNs) using the Schwarz alternating method.
15. *Jinny Chung, Peter Krenek, Siqi Ma* (9/2023-12/2023), M.S. students at Stanford University.
    - Project: coupling and optimal parameter tuning for PINN-PINN coupling using the overlapping and non-overlapping Schwarz alternating method.
16. *Jake Nichol* (10/2020-5/2025), Ph.D. student at University of New Mexico, currently postdoctoral fellow at Sandia National Laboratories
    - Project: identifying source-impact pathways in climate models using random forest regression and causal modeling.
17. *Amy de Castro* (10/2021-5/2025), currently postdoctoral fellow at University of Utah.
    - Project: developing novel methods for coupling conventional and data-driven models.

18. *Arjun Vijaywargiya* (6/2024-5/2025), Ph.D. student at University of Notre Dame, currently Peter O'Donnell Post Doctoral Fellow at the University of Texas at Austin.
    - Project: developing an approach for generating parametric operator inference (OpInf) reduced order models.
19. *Cameron Rodriguez* (5/2025-8/2025), Ph.D. student at Columbia University
    - Project: examining the influence of transmission conditions on the convergence of the Schwarz alternating method for the domain decomposition-based coupling of conventional and data-driven models.
20. *Rafael Calleros Delgato* (5/2024-5/2025. 6/2025-1/2026), M.S. student at New Mexico State University, currently at Intel Corporation
    - Project: research, development and implementation of modern performance anslysis/tuning tools towards the monitoring of high-resolution simulations of Earth's polar ice sheets on large supercomputers.
21. *Ian Moore* (5/2024-6/2026), Ph.D. student at Virginia Tech, currently post doctoral fellow at Rice University
    - Project: advancing the Schwarz alternating method as a means to couple together subdomain-local operator inference (OpInf) reduced order models with each other and with subdomain-local high-fidelity models.
22. *Ritoban Roy-Chowdhury* (6/2025-8/2026), B.S. student at University of California San Diego
    - Project: developing a method for data-informed variational integration using Onsager's principle.
23. *George Chumbipuma* (5/2026-8/2026), Ph.D. student at Rice University
    - Project: advancing the Schwarz alternating method as a means to facilitate the training of and couple together numerics-informed neural networks (NINNs).
24. *Trishit Mondal* (5/2026-8/2026), Ph.D. student at Worcester Polytechnic Institute
    - Project: investigating reinforcement learning algorithms to enable on-the-fly reduced order model – full order model switching within a Schwarz alternating method coupling framework.
25. *Mark Wilkinson* (5/2026-8/2026), Ph.D. student at Purdue University
    - Project: Accelerating mod/sim using domain decomposition methods and group theory
26. *Lukas Ostien* (6/2026-present), M.S. student at University of California Irvine
    - Project: Accessing optimal transmission conditions and acceleration techniques for the non-overlapping Schwarz alternating method used to perform multi-scale coupling in solid mechanics.
27. *James Cash* (6/2026-present), Ph.D. student at University of Alberta
    - Project: developing a variational formulation for visco-thermo-elasticity, towards enabling the construction of structure preserving data-driven models.

PEER-REVIEWED PUBLICATIONS

1. M.F. Barone, **I. Kalashnikova**, D.J. Segalman, H. Thornquist. "Stable Galerkin Reduced Order Models for Linearized Compressible Flow". *J. Comput. Phys.* 288 1932-1946, 2009. https://doi.org/10.1016/j.jcp.2008.11.015
2. **I. Kalashnikova**, C. Farhat, R. Tezaur. "A Discontinuous Enrichment Method for the Solution of Advection-Diffusion Problems in High Peclet Number Regimes". *Fin. El. Anal. Des.* 45 238-250, 2009. https://doi.org/10.1002/nme.2706

3. C. Farhat, **I. Kalashnikova**, R. Tezaur. "A Higher-Order Discontinuous Enrichment Method for the Solution of High Peclet Advection-Diffusion Problems on Unstructured Meshes". *Int. J. Numer. Meth. Engng.* 81 604-636, 2010. https://doi.org/10.1002/nme.2706
4. **I. Kalashnikova**, M.F. Barone. "On the Stability and Convergence of a Galerkin Reduced Order Model (ROM) of Compressible Flow with Solid Wall and Far-Field Boundary Treatment". *Int. J. Numer. Meth. Engng.* 83 1345-1375, 2010. https://doi.org/10.1002/nme.2867
5. **I. Kalashnikova**, R. Tezaur, C. Farhat. "A Discontinuous Enrichment Method for Variable Coefficient Advection-Diffusion at High Peclet Number". *Int. J. Numer. Meth. Engng.* 87 309-335, 2010. https://doi.org/10.1002/nme.3058
6. **I. Kalashnikova**, M.F. Barone. "Efficient Non-Linear Proper Orthogonal Decomposition (POD)/Galerkin Reduced Order Models with Stable Penalty Enforcement of Boundary Conditions", *Int. J. Numer. Meth. Engng.* 90(11) 1337-1362, 2012. https://doi.org/10.1002/nme.3366
7. **I. Kalashnikova**, M.F. Barone, M.R. Brake. "A Stable Reduced Order Model for Coupled Fluid/Structure Interaction Problems", *Int. J. Numer. Meth. Engng.* 95(2) 121-144, 2013. https://doi.org/10.1002/nme.4499
8. R. Tezaur, **I. Kalashnikova**, C. Farhat. "Discontinuous Enrichment Method for Variable Wavenumber Medium-Frequency Helmholtz Problems". *Comput. Meth. Appl. Mech. Engng.* 268 126-140, 2014. https://doi.org/10.1016/j.cma.2013.08.017
9. **I. Kalashnikova**, B.G. van Bloemen Waanders, S. Arunajatesan, M.F. Barone. "Stabilization of Projection-Based Reduced Order Models for Linear Time-Invariant Systems via Optimization-Based Eigenvalue Reassignment". *Comput. Meth. Appl. Mech. Engng.* 272 251-270, 2014. https://doi.org/10.1016/j.cma.2014.01.011
10. **I. Kalashnikova**, M.F. Barone, S. Arunajatesan, B.G. van Bloemen Waanders. "Construction of Energy-Stable Projection-Based Reduced Order Models". *Appl. Math. Computat.* 249 569-596, 2014. https://doi.org/10.1016/j.amc.2014.10.073
11. **I. Tezaur**, M. Perego, A. Salinger, R. Tuminaro, S. Price. "*Albany/FELIX*: A Parallel, Scalable and Robust Finite Element Higher-Order Stokes Ice Sheet Solver Built for Advanced Analysis", *Geosci. Model Develop.* 8 1-24, 2015. https://doi.org/10.5194/gmd-8-1197-2015
12. **I. Tezaur**, R. Tuminaro, M. Perego, A. Salinger, S. Price. "On the scalability of the *Albany/FELIX* first-order Stokes approximation ice sheet solver for large-scale simulations of the Greenland and Antarctic ice sheets", *Procedia Computer Science,* 51 2026-2035, 2015. https://doi.org/10.1016/j.procs.2015.05.467
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24. D. Bull, C. Flanary, C. Jones, J. Frederick, A. Mota, **I. Tezaur**, J. Kasper, E. Brown, B. Jones, M. Jones, E. Bristol, C. Choens, C. Connoly, J. McClelland. "Arctic Coastal Erosion: Modeling and Experimentation". *Sand No. 2020-10223*. Sandia National Laboratories, Albuquerque, NM, 2020.
25. A. Powell, **I. Tezaur**, W. Davis, K. Peterson, S. Rempe, C. Smallwood, E. Roelser. "Predicting Future Disease Burden in a Rapidly Changing Climate". *Sand No. 2020-10322.* Sandia National Laboratories, Albuquerque, NM, 2020.
26. D. Bull, L. Swiler, K. Peterson, **I. Tezaur**, L. Shand, W. Davis, B. Wagman, M. Peterson, E. Roesler. "Climate Intervention Assessment and Attribution". *Sand No. 2021-1590O. White Paper Submitted to DOE's BER Earth and Environmental Science Division (EESSD) to Advance Artificial Intelligence Framework for Earth System Predictability (AI4ESP)*, Feb. 2021.
27. A. Powell, E. Acquesta, W. Davis, J. Nichol**, I. Tezaur**, K. Peterson, S. Rempe, G. Huerta. "Water Cycle-Driven Infectious Diseases as Multiscale, Reliable, Continuously Updating Water Cycle Sensors". *Sand No. 2021-1667O. White Paper Submitted to DOE's BER Earth and Environmental Science Dicision*

(EESSD) to Advance Artificial Intelligence Framework for Earth System Predictability (AI4ESP), Feb. 2021.

28. E. Bayat, D. Bull, J. Frederick, A. Mota, **I. Tezaur.** "Arctic Critical Infrastructure. Assessing and Predicting the Risk to Critical Permafrost Infrastructure from Climate Change: A New Thermomechanical Approach". *Sand No. 2024-1231R.* Sandia National Laboratories, Albuquerque, NM, 2024.
29. P. Bochev, **I. Tezaur**, P. Kuberry, A. Mota, J. Owen, C. Sockwell, C. Wentland, J. Barnett, A. de Castro, E. Hawkins, E. Huynh, I. Moore, R. Pawar, W. Snyder, A. Masud. "Rigorous and agile coupling of conventional and data-driven models for heterogeneous multi-physics, multi-scale simulations. Final LDRD Report". *Sand No. 2024-12525R.* Sandia National Laboratories, Albuquerque, NM, 2024.
30. D. Bull, K. Peterson, L. Shand, L. Swiler, **I. Tezaur**. "Climate Impact: Determining Etiology through pAthways (CLDERA). *Sand no. 2024-12423R.* Sandia National Laboratories, Albuquerque, NM, 2024.
31. Q. He, R. Duddu, **I. Tezaur**, M. Perego. "Hybrid physics and machine learning approaches for differentiable inversion of ice sheet system model parameters", *White Paper Submitted to the ASCR Workshop on Inverse Methods for Complex Systems under Uncertainty,* April 2025.
32. N. Urban, S. Jantre, X. Qian, K. Reyes**, I. Tezaur**, A. Gruber, Y. Choi. "Model-form uncertainties for complex and expensive black-box simulations from system identification and model reduction", *White Paper Submitted to the ASCR Workshop on Inverse Methods for Complex Systems under Uncertainty,* April 2025.
33. I. Moore, A. Gruber, C. Wentland, **I. Tezaur.** "Domain decomposition-based coupling of high-fidelity finite element and reduced order operator inference models using the Schwarz alternating method". *Extended abstract submitted to the 2025 Robert J. Melosh Medal Competition*, August 2025. [ArXiv]
34. A.Mota, B. Phung, M. Diab, **I. Tezaur**, M. Merewether, L. Ostien. "Schwarz coupling for multiscale modeling and simulation: final report for an FY26 ASC physics and engineering models Level 2 milestone". *Sand no. 2026- 27918.* Sandia National Laboratories, Albuquerque, NM, 2026.

INVITED (ALL EXPENSES PAID) PLENARY CONFERENCE PRESENTATIONS

1. **I. Tezaur**, A. Mota, C. Alleman, G. Phlipot, C. Wentland, J. Barnett, F. Rizzi. "Accelerating mod/sim workflows through hybrid domain decomposition-based models and the Schwarz alternating method". *European Seminar on COmputing (ESCO) 2024.* Pilsen, CZ. Invited plenary presentation. June 10-14, 2024.
2. **I. Tezaur**. "Accelerating modeling & simulation workflows via the Schwarz alternating method for multi-scale coupling and contact". *XLVI Ibero-Latin American Congress on Computational methods in Engineering (CILAMCE 2025),* Vitoria, Brazil. Invited plenary presentation. Nov. 24-27, 2025.
3. **I. Tezaur.** "Assessing and anticipating Arctic risks: advanced modeling of permafrost erosion and infrastructure stability". *SIAM Conference on Mathematics of Planet Earth (MPE26),* Cleveland, OH. Invited plenary presentation. July 6-8, 2026.

INVITED (ALL EXPENSES PAID) UNIVERSITY AND LABORATORY SEMINARS

4. **I. Kalashnikova**. "A Discontinuous Enrichment Method for the Solution of the Advection-Diffusion Equation". *Robert J. Melosh Medal Competition for the Best Student Paper on Finite Element Analysis*, Department of Civil and Environmental Engineering, Duke University, Durham, NC, April 25, 2008.

5. **I. Kalashnikova**, R. Tezaur, C. Farhat. "The Discontinuous Enrichment Method for Advection-Dominated Transport Phenomena in Computational Fluid Dynamics". *10th Bay Area Scientific Computing Day (BASCD 2011)*, Institute for Computational & Mathematical Engineering, Stanford University, Stanford, CA, May 8, 2011.
6. **I. Tezaur**. "Computational Methods in Ice Sheet Modeling for Next-Generation Climate Simulations", *Civil and Environmental Engineering Seminar*, Duke University, Durham, NC, November 16, 2015.
7. **I. Tezaur**, M. Barone, J. Fike, M. Balajewicz, S. Arunajatesan, B. van Bloemen Waanders, E. Dowell. "Approaches for building stable projection-based reduced order models for compressible flow", *Virginia Tech Mathematics Department Colloquium*, Blacksburg, VA, May 1, 2017.
8. **I. Tezaur**. "Next-generation modeling and simulation of large-scale ice sheets towards probabilistic sea-level change projections", *University of Michigan Institute for Computational Discovery and Engineering (MICDE) Seminar*, Ann Arbor, MI, Oct. 25, 2017.
9. **I. Tezaur,** M. Barone, J. Fike, M. Balajewicz, S. Arunajatesan, B. van Bloemen Waanders, E. Dowell. " Stability-preserving projection-based model order reduction for compressible flows", *University of California Berkeley / Lawrence Berkeley Laboratory Applied Mathematics Seminar*, Berkeley, CA, Dec. 6, 2017.
10. **I. Tezaur.** "Albany Land-Ice (ALI): A Next-Generation Variable-Resolution Ice Sheet Model Towards Probabilistic Projections of Sea-Level Change", *Scientific Computing Seminar*, Uppsala University, Uppsala, Sweden. Oct. 17, 2019.
11. **I. Tezaur**, A. Mota, C. Alleman, G. Phlipot. "Concurrent multiscale coupling in solid mechanics using the Schwarz alternating method". *2020 Pacific Northwest Numerical Analysis Seminar (PNWNAS)*, Online Meeting, Oct. 17, 2020.
12. A. Mota, **I. Tezaur**, C. Alleman, G. Phlipot. "The Schwarz alternating method as a means for concurrent multiscale coupling in solid mechanics". *Data-Driven Physical Simulations (DDPS) Seminar*, Lawrence Livermore National Laboratory, Livermore, CA. Jan. 7, 2020.
13. **I. Tezaur. "**Computational Methods in Ice Sheet Modeling for Next-Generation Climate Simulations." *Computational & Mathematical Engineering (CME) 500 Seminar: Computational Math in Industry and Beyond*, Stanford University, Stanford, CA. Feb. 22, 2021.
14. **I. Tezaur. "**Computational Methods in Ice Sheet Modeling for Next-Generation Climate Simulations." *Aerospace and Mechanical Engineering Seminar*, College of Engineering, University of Notre Dame, Notre Dame, Indiana. Feb. 23, 2021.
15. **I. Tezaur**. "My Career as a Computational Scientist at Sandia National Labs." *STEM Career Seminar*, School of Science at Casper College, Casper, Wyoming. Apr. 15 2021
16. J. Frederick, A. Mota, **I. Tezaur**, D. Bull. "Advanced modeling and simulation of Arctic coastal erosion." *Advanced Modeling & Simulation Seminar*, University of Texas El Paso, El Paxo, TX. May 7. 2021.
17. J. Frederick, A. Mota, **I. Tezaur**, C. Choens, D. Bull. "Development of a novel thermo-mechanical model for simulating permafrost demise and Arctic coastal erosion." *Glaciological Seminar,* ETH Zurich, Zurich, Switzerland. Apr. 28 2022.
18. D. Bull, K. Peterson, **I. Tezaur**, L. Shand, L. Swiler. "An Overview of the CLDERA Grand Challenge LDRD Project: Developing a Novel Foundational Approach for Attributing Climate Impacts". *CSRI Summer Seminar Series 2022*, Sandia National Laboratories, August 23, 2022.
19. **I. Tezaur**, A. Mota, C. Alleman, G. Phlipot, J. Barnett. "The Schwarz alternating method as a means for concurrent multi-scale coupling of conventional and data-driven models". *Department of Mathematics & Statistics Colloquium,* University of Nevada, Reno, NV, February 2, 2023.

20. **I. Tezaur**, J. Barnett, A. Mota, A. de Castro, P. Kuberry, P. Bochev. "Component-based coupling of first-principles and data-driven models". *1st ARIA Workshop on Model Reduction*, INRIA Bordeaux, Bordeaux, France, Mar. 8-10, 2023.
21. **I. Tezaur**, C. Wentland, F. Rizzi, J. Barnett, A. Mota, A. de Castro, P. Bochev. "Rigorous component-based coupling of first-principles and data-driven models". *Numerical Analysis of Galerkin ROMs (NA-GROMs) seminar series.* Virtual, April 30, 2024.
22. **I. Tezaur.** "Accelerating modeling & simulation workflows via the Schwarz alternating method for multi-scale coupling and contact". *Worcester Polytechnic Institute (WPI) Aeroscience Seminar*. Virtual. Dec. 5, 2025.
23. **I. Tezaur**. "Hybrid Schwarz-Based Coupling: A Plug-and-Play Framework for Integrating Model Reduction with High-Fidelity Simulation". Advances in low rank and model reduction methods for PDEs, Rome, Italy, Nov. 11-13, 2026.

INVITED MINISYMPOSIUM TALKS

1. **I. Kalashnikova**, S. Arunajatesan. "A Stable Galerkin Reduced Order Model (ROM) for Compressible Flow". *10th World Congress on Computational Mechanics (WCCM)*, Sao Paulo, Brazil, July 13, 2012.
2. **I. Kalashnikova**, S. Arunajatesan. "Towards Feedback Control of Compressible Flows Using Galerkin Reduced Order Models". *Second International Workshop on Model Reduction for Parametrized Systems (MoRePaS II)*, Schloss Reisensburg, Gunzburg,Germany, Oct. 2-5, 2012.
3. **I. Kalashnikova**, S. Arunajatesan, B. van Bloemen Waanders. "Energy-Stable Galerkin Reduced Order Models for Prediction and Control of Fluid Systems". *SIAM Conference on Computational Science and Engineering (CSE13)*, Boston, MA, Feb. 26, 2013.
4. **I. Kalashnikova**, B.G. van Bloemen Waanders, S. Arunajatesan, M.F. Barone. "Stabilized Projection-Based Reduced Order Models for Uncertainty Quantification". *SIAM Conference on Uncertainty Quantification (SIAM UQ14)*, Savannah, GA, Mar. 31-Apr. 3, 2014.
5. **I. Kalashnikova**, J.A. Fike, M.F. Barone, S. Arunajatesan, B. van Bloemen Waanders. "Energy-stable Galerkin Reduced Order Models for Nonlinear Compressible Flow", *World Congress on Computational Mechanics (WCCM XI)*, Barcelona, Spain, July 20-25, 2014.
6. **I. Tezaur**, A. Salinger, M. Perego, R. Tuminaro. "On the Development and Performance of a First Order Stokes Finite Element Ice Sheet Dycore Built Using Trilinos Software Components", *SIAM Conference on Computational Science & Engineering (CS&E)* , Salt Lake City, Utah, March 13-18, 2015.
7. **I. Tezaur**, B. van Bloemen Waanders, S. Arunajatesan, M. Barone, J. Fike. "Stabilization of Projection-Based Reduced Order Models via Optimization-Based Eigenvalue Reassignment", *1st Pan-American Congress on Computational Mechanics (PANACM) 2015*, Buenos Aires, Argentina, April 27-29, 2015.
8. **I. Tezaur**, R. Tuminaro, M. Perego, A. Salinger, S. Price. "On the Scalability of the Albany/FELIX First-Order Stokes Approximation Ice Sheet Solver for Large-Scale Simulations of the Greenland and Antarctic Ice Sheets", *International Conference on Computational Science (ICCS) 2015*, Reykjavik, Iceland, June 1-3, 2015.
9. M. Balajewicz, **I. Tezaur**. "Stabilization and fine-tuning of projection-based reduced order models for compressible flow via minimal subspace rotation on the Stiefel manifold", *International Congress on Industrial and Applied Mathematics (ICIAM) 2015*, Beijing, China, August 10-14, 2015.
10. **I. Tezaur**, A. Salinger, M. Perego, J. Jakeman, M. Eldred, I. Demeshko, R. Tuminaro, S. Price. "Albany/FELIX: A Robust and Scalable Trilinos- Based Finite-Element Ice Flow Dycore Built for

Advanced Architectures and Analysis", *International Congress on Industrial and Applied Mathematics (ICIAM) 2015*, Beijing, China, August 10-14, 2015.

11. **I. Tezaur**, M. Balajewicz. "A minimal subspace rotation approach for stabilizing and fine-tuning projection-based reduced order models for fluid applications", *West Coast ROM Workshop*, Livermore, CA, November 19, 2015.
12. **I. Tezaur**. "Land-Ice and Atmospheric Modeling at Sandia: the Albany/FELIX and Aeras Solvers", *Center 8300 Climate Kickoff Workshop*, Livermore, CA, December 9, 2015.
13. **I. Tezaur**, J. Jakeman, M. Eldred, M. Perego, A. Salinger, S. Price, "Towards Uncertainty Quantification in 21st Century Sea-Level Rise Predictions: Efficient Methods for Bayesian Calibration and Forward Propagation of Uncertainty for Land-Ice Models", *SIAM Conference on Uncertainty Quantification*, Lausanne, Switzerland, April 5-8, 2016.
14. **I. Tezaur**, M. Balajewicz. "A minimal subspace rotation approach for obtaining stable & accurate low-order projection-based reduced order models for nonlinear compressible flow", *World Congress on Computational Mechanics (WCCM) 2016*, Seoul, South Korea, July 25-30, 2016.
15. **I. Tezaur**, A. Salinger, M. Perego, R. Tuminaro, S. Price, J. Watkins, G. Hansen. "The Albany/FELIX First-Order Stokes Finite Element Ice Sheet Dynamical Core Built Using Trilinos Software Components: Performance, Next-Generation Capabilities and Validation", *SIAM Conference on Mathematics of Planet Earth 2016*, Philadelphia, PA, Sept. 30-Oct. 2, 2016.
16. **I. Tezaur**, M. Balajewicz. "A minimal subspace rotation approach for extreme model reduction in fluid mechanics", *Recent Developments in Numerical Methods for Model Reduction*, Paris, France, Nov. 7-10, 2016.
17. **I. Tezaur**, A. Mota, C. Alleman. "Continuum-to-continuum concurrent multiscale coupling in solid mechanics via the Schwarz alternating method". *SIAM Conference on Computational Science and Engineering (CSE) 2017*, Atlanta, GA, Feb. 27-Mar. 3, 2017.
18. **I. Tezaur**, J. Watkins, I. Demeshko. "A Performance-Portable Implementation of the Finite Element Assembly in an Atmosphere and Land-Ice Code using the Kokkos Library". *IACM 19th International Conference on Finite Elements in Flow Problems (FEF 2017)*, Rome, Italy, April 5-7, 2017.
19. **I. Tezaur**, A. Mota, C. Alleman. "The Schwarz alternating method for concurrent multiscale coupling in solid mechanics", *VII International Conference on Computational Methods for Coupled Problems in Science and Engineering (COUPLED 2017)*, Rhodes Island, Greece, June 12-14, 2017.
20. **I. Tezaur**, J. Jakeman, M. Perego, S. Price. "Large-scale deterministic inversion and Bayesian calibration in land-ice modeling", *US National Congress on Computational Mechanics (USNCCM) 2017*, Montreal, Quebec, Canada, July 17-20, 2017.
21. **I. Tezaur**, J. Watkins, R. Tuminaro, I. Demeshko. "Performance and Performance Portability of the Albany/FELIX Finite Element Land-Ice Solver", *SIAM Conference on Mathematical and Computational Issues in Geosciences (GS) 2017*, Erlangen, Germany, Sept. 11-14, 2017.
22. **I. Tezaur,** J. Watkins, I. Demeshko. "Towards performance-portability of the Albany/FELIX land-ice solver to new and emerging architectures using Kokkos", *6th European Seminar on Scientific COmputing (ESCO 2018)*, Pilsen, Czech Republic, June 3-8, 2018.
23. **I. Tezaur,** A. Mota, G. Phlipot. "The Schwarz alternating method for dynamic multi-scale coupling in solid mechanics", *World Congress on Computational Mechanics (WCCM) 2018,* New York, NY, July 22-27, 2018.
24. **I. Tezaur,** A. Salinger, G. Hansen, D. Ibanez. "Albany: a Trilinos-based multi-physics partial differential equation research tool created using the Agile Components code development strategy," *SIAM Conference on Computational Science and Engineering (CSE) 2019 (featured minisymposium entitled "Multiphysics: Extensible, Composable Algorithms and Software")*, Spokane, WA. Feb. 25-Mar. 1, 2019.

25. **I. Tezaur**, J. Watkins, R. Tuminaro, M. Perego, A. Salinger, S. Price. "*Trilinos/Kokkos*-based strategy towards achieving a performance portable land-ice model", *Banff International Research Station for Mathematical Innovation and Discovery (BIRS) workshop entitled Mathematical Modelling in Glaciology (20w5198),* Banff, Alberta, Canada. Jan. 12-17, 2020.
26. A. Mota, J. Frederick, C. Choens, D. Bull, **I. Tezaur**. "Development of a strongly-coupled thermo-mechanical model of permafrost for the simulation of Arctic coastal erosion", *European Seminar on COmputing (ESCO) 2020*, Online Meeting. June 8-12, 2020.
27. **I. Tezaur**. "Model Reduction at Sandia National Labs". *AIAA SciTech 2021, Technical Panel entitled "Application of Data-Driven Methods to Chemically Reacting Flows",* Online Meeting. Jan. 20, 2021.
28. J. Watkins, M. Carlson, **I. Tezaur.** "Performance portability of the Albany multi-physics finite element code on the road to exascale", *Platform for Advanced Scientific Computing (PASC) 2021*, Online Meeting. July 5-9, 2021.
29. A. Mota, J. Frederick, **I. Tezaur**, D. Bull. "A thermo-mechanical model of permafrost for the simulation of Arctic coastal erosion", *16th U.S. National Congress on Computational Mechanics (USNCCM 16).* July 25-29, 2021.
30. P. Lindsay, J. Fike, K. Carlberg, **I. Tezaur.** "Preconditioned Least-Squares Petrov-Galerkin reduced order models for fluid and solid mechanics problems". *Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering and Technology (MMLDT-CSET)*, San Diego, CA. Sept. 26-29, 2021.
31. A. Mota, **I. Tezaur**, J. Hoy. "The Schwarz alternating method for multi-scale coupling and contact in solid mechanics". *3rd Pan American Congress on Computational Mechanics.* Rio de Janeiro, Brazil. Nov. 9-12, 2021.
32. **I. Tezaur,** K. Peterson, A. Powell, J. Jakeman, E. Roesler. "Global sensitivity analysis using the ultra-low resolution Energy Exascale Earth System Model". *SIAM Conference on Uncertainty Quantification (UQ) 2022,* Atlanta, GA, April 12-15, 2022.
33. P. Lindsay, J. Fike, **I. Tezaur**, K. Carlberg. "Preconditioned Least-Squares Petrov-Galerkin Reduced Order Models for Fluid and Solid Mechanics Problems". *Minisymposium keynote talk at 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS) 2022*, Oslo, Norway, June 5-9, 2022.
34. **I. Tezaur,** K. Peterson, A. Powell, J. Jakeman, E. Roesler. "Global sensitivity analysis using the ultra-low resolution Energy Exascale Earth System Model". *European Seminar on COmputing (ESCO) 2022,* Pilsen, CZ, June 13-17, 2022.
35. **I. Tezaur,** K. Peterson, A. Powell, J. Jakeman, E. Roesler. "Global sensitivity analysis using the ultra-low resolution Energy Exascale Earth System Model". *SIAM Conference on Mathematics of Planet Earth (MPE) 2022,* Atlanta, GA, July 13-15, 2022.
36. **I. Tezaur**, M. Carlson, J. Watkins, M. Perego, K. Shan, C. Kao, K. Liegeois. "Achieving and maintaining performance and performance portability within the Albany multi-physics code: perspectives and tools", *SIAM Conference on Computational Science & Engineering (CSE) 2023,* Amsterdam, The Netherlands, Feb. 27-Mar. 3, 2023.
37. D. Bull, K. Peterson, **I. Tezaur,** L. Shand, L. Swiler. "CLDERA: Developing a Novel Founcational Approach for Attributing Localized Source Forcings in the Climate". *Minisymposium Keynote Talk at 22nd IACM ComputationL Fluids Conference (CFC) 2023,* Cannes, France. April 25-28, 2023.
38. **I. Tezaur**, J. Barnett, A. Mota, C. Wentland, W. Snyder. "Alternating Schwarz-based coupling of conventional and data-driven models". *10th International Conference on Computational Methods for Coupled Problems in Science & Engineering (COUPLED 2023),* Chania, Greece. June 5-7, 2023.
39. **I. Tezaur,** K. Peterson, A. Powell, J. Jakeman, E. Roesler. "Ensemble design for sensitivity analysis using the Energy Exascale Earth System Model (E3SM)". *Conference on Mathematical & Computational Issues in the Geosciences (GS23)*, Bergen, Norway. June 19-22, 2023.

40. J. Frederick, A. Mota, **I. Tezaur**, C. Choens, D. Bull, E. Bayat. "Development and calibration of the Arctic Coastal Erosion (ACE) Model, Towards UQ of Climate Change-Induced Arctic Permafrost Degradation", *SIAM Conference on Uncertainty Quantification (UQ24),* Trieste, Italy. Feb. 27-Mar. 1, 2024.
41. **I. Tezaur**, C. Wentland, F. Rizzi, J. Barnett, A. Mota. "Flexible domain decomposition-based couplings of conventional and data-driven models via the Schwarz alternating method", *2nd International Joint Meeting co-organized by the Unione Mathematica Italiana and the American Mathematical Society (UMI-AMS)*, Palermo, Italy. June 23-26, 2024.
42. **I. Tezaur**, C. Wentland, F. Rizzi, J. Barnett, A. Mota. "Towards adaptive hybrid models via domain decomposition and the Schwarz alternating method", *Joint Mathematics Meetings (JMM) 2025,* Seattle, WA. Jan. 8-11, 2025.
43. C. Wentland, F. Rizzi, J. Barnett, **I. Tezaur**, A. Mota. "Domain decomposition-based coupling of subdomain-local reduced order models (ROMs) in fluid mechanics using the Schwarz alternating method", *Computational Fluids Conference (CFC) 2025*, Santiago, Chile. Mar. 17-20, 2025.
44. J. Frederick, A. Mota, **I. Tezaur,** D. Bull, E. Bayat. "Assessing permafrost erosion and infrastructure using the Arctic Coastal Erosion (ACE) coupled thermos-mechanical model". *Minisymposium Keynote Lecture at the XI International Conference on Coupled Problems in Science and Engineering (COUPLED 2025),* May 26-29, 2025, Villasimius (Sardinia), Italy.
45. **I. Tezaur,** C. Wentland, I. Moore, E. Parish, A. Gruber, A. Mota. "Domain decomposition-based coupling of intrusive and non-intrusive reduced order models via the Schwarz alternating method", *15th International Conference on Large-Scale Scientific Computations (LSSC 2025),* June 16-20, 2025, Sozopol, Bulgaria.
46. **I. Tezaur,** E. Parish, A. Gruber, I. Moore, C. Wentland, A. Mota. "(Towards) adaptive hybrid domain decomposition-based modeling via Operator Inference and the Schwarz alternating method". *17th World Congress on Computational Mechanics (WCCM),* July 19-24, 2026, Munich, Germany.
47. **I. Tezaur**, E. Parish, A. Gruber, I. Moore, C. Wentland, A. Diaz, C. Rodriguez, A. Mota, P. Blonigan. "(Towards) Adaptive Hybrid Modeling via Schwarz Alternating Coupling and Operator Inference Reduced Order Models", Model Reduction and Surrogate Modeling (MORe 2026), Milan, Italy. Nov. 2-6, 2026.

OTHER TALKS

1. **I. Kalashnikova**, M.F. Barone. "Stable and Efficient Galerkin Reduced Order Models for Non-Linear Fluid Flow". *6th AIAA Theoretical Fluid Mechanics Conference*, Honolulu, HI, June 27, 2011.
2. **I. Kalashnikova**, R. Tezaur, C. Farhat. "The Discontinuous Enrichment Method for Multi-Scale Fluid Problems". *7th International Congress on Industrial and Applied Mathematics (ICIAM 2011)*, Vancouver, BC, Canada, July 22, 2011.
3. **I. Kalashnikova**, A. Salinger, R. Tuminaro. "A new unstructured variable-resolution finite element ice sheet stress-velocity solver within the MPAS/Trilinos FELIX dycore of PISCEES". *CESM Land Ice Working Group Meeting*, National Center for Atmospheric Research (NCAR) - Mesa Lab, Boulder, CO, Feb. 14, 2013.
4. **I. Kalashnikova** , B.G. van Bloemen Waanders, S. Arunajatesan, M.F. Barone. "Stabilization of Galerkin Reduced Order Models (ROMs) for LTI Systems Using Controllers". *SIAM Conference on Control and Its Applications (CT13)*, San Diego, CA, July 9, 2013.
5. **I. Kalashnikova**, A. Salinger, M. Perego, R. Tuminaro, J. Jakeman, M. Eldred. "FELIX: the Albany Ice Sheet Modeling Code". *Albany User Group Meeting*, Sandia National Laboratories, Albuquerque, NM, Jan. 15-16, 2014.

6. **I. Kalashnikova**, A. Salinger, M. Perego, R. Tuminaro, S. Price. "The Albany/FELIX First-Order Stokes Dycore". *CESM Land Ice Working Group Meeting*, National Center for Atmospheric Research (NCAR) - Mesa Lab, Boulder, CO, Jan. 30-31, 2014.
7. **I. Kalashnikova**. Albany/FELIX: A New Parallel, Scalable and Robust First-Order Stokes Ice Sheet Simulation Code", Technical Seminar, Sandia National Laboratories, Livermore, CA, July 3, 2014.
8. **I. Kalashnikova**, A. Salinger, M. Perego, R. Tuminaro, S. Price. "An Update on the Albany/FELIX First Order Stokes Finite Element Solver and Its Coupling to Land Ice Dycores", *CESM Annual Workshop*, Breckenridge, CO, June 16-19, 2014.
9. **I. Kalashnikova**, J.A. Fike, M.F. Barone, S. Arunajatesan, B. van Bloemen Waanders. "Approaches for Building Stable Projection-Based Reduced Order Models", *Reduced-Order Modeling Workshop*, Sandia National Laboratories, Livermore, CA, August 7, 2014.
10. **I. Kalashnikova**, M. Perego, A. Salinger, R. Tuminaro, S. Price. "Update on the Albany/FELIX First Order Stokes Solver and the CISM-Albany and MPAS-Albany Dycores", *CESM Land Ice Working Group Meeting*, National Center for Atmospheric Research (NCAR) - Mesa Lab, Boulder, CO, February 2-3, 2015.
11. **I. Tezaur**, M. Balajewicz. "A minimal subspace rotation approach for obtaining stable & accurate low-order projection-based reduced order models for nonlinear compressible flow", *European Congress on Computational Methods in Applied Sciences & Engineering (ECCOMAS) 2016*, Crete, Greece, June 5-10, 2016.
12. **I. Tezaur**, A. Salinger, M. Perego, R. Tuminaro, J. Jakeman, M. Eldred, J. Watkins, S. Price, I. Demeshko. "The Albany/FELIX Land-Ice Dynamical Core". *2017 Albany User's Group Meeting*, Livermore, CA, Jan. 17-18, 2017.
13. **I. Tezaur**. "Proper Orthogonal Decomposition (POD) Closure Models for Turbulent Flows", *Data Science Reading Group Seminar*, Livermore, CA, May 18, 2017.
14. A. Mota, **I. Tezaur**, C. Alleman, G. Phlipot. "The Schwarz alternating method for multiscale coupling in solid mechanics", *VIII International Conference on Computational Methods for Coupled Problems in Science and Engineering (COUPLED 2019)*, Sitges, Spain. June 3-5, 2019.
15. A. Mota, **I. Tezaur**, C. Alleman, G. Phlipot. "The Schwarz alternating method for multiscale coupling in solid mechanics", *International Conference on Computational Science (ICCS) 2019*, Faro, Portugal. June 12-14, 2019.
16. A. Mota, **I. Tezaur,** C. Alleman, G. Phlipot. "The Schwarz alternating method for multiscale coupling in solid mechanics". *Computational Methods in Multi-Scale, Multi-Uncertainty and Multi-Physics Problems (CM4P 2019)*, Porto, Portugal. July 15-17 2019.
17. **I. Tezaur** *et al.* "Verification and Testing Infrastructure and Demonstrations", *DOE Energy Exascale Earth System Model (E3SM) All-Hands Meeting*, Crystal City, MD. November 19-21, 2019.
18. T. Voth, **I. Tezaur,** J. Niederhaus. "XFEM Development in the ALEGRA code", *ALEGRA Winter Workshop 2019*, Sandia National Laboratories, Albuquerque, NM. December 10-12, 2019.
19. **I. Tezaur**, A. Mota, C. Alleman, G. Phlipot. "The Schwarz alternating method for continuum-to-continuum multiscale coupling in solid mechanics", *Albany User Meeting (AUM) 2020*, Albuquerque, NM. Jan. 27-28, 2020.
20. A. Mota, J. Frederick, C. Choens, D. Bull, **I. Tezaur**. "Development of a strongly-coupled thermo-mechanical model of permafrost for the simulation of Arctic coastal erosion", *Climate Modeling Seminar*, Sandia National Laboratories. June 24, 2020.
21. A. Mota, **I. Tezaur**, C. Alleman, G. Phlipot. "Concurrent multiscale coupling in solid mechanics using the Schwarz alternating method". *Engineering Sciences Seminar*, Sandia National Laboratories, Livermore, CA and Albuquerque, NM. Nov. 12, 2020.

22. A. Mota, **I. Tezaur**, D. Koliesnikova, J. Hoy. "The Schwarz alternating method for multi-scale contact dynamics". *Congress on Numerical Methods in Engineering (CMN) 2023*, Las Palmas de Gran Canaria, Spain. Sept. 12-14, 2022.

POSTER PRESENTATIONS

1. **I. Kalashnikova**, C. Farhat, R. Tezaur. "Recent extensions of the discontinuous enrichment method (DEM) to advection-dominated fluid mechanics problems". *10th U.S. National Congress on Computational Mechanics (USACM)*, Ohio State University, Columbus, OH (July 2009).
2. A.G. Salinger, **I. Kalashnikova**, M. Perego, R.S. Tuminaro, M.S. Eldred, J.D. Jakeman. "Rapid development of an ice sheet climate application using the component-based approach". *CIS External Review*, Sandia National Laboratories, Albuquerque, NM (May 2013).
3. **I. Kalashnikova**, D. Martin, S. Price. "Ice sheet dynamical core development for PISCEES". *SciDAC Principal Investigator Meeting*, Hilton Executive Meeting Center, Rockville, MD (July 2013).
4. A. Salinger, A. Bradley, I. Demeshko, G. Hansen, M. Perego, E. Phipps, **I. Tezaur**, R. Tuminaro, B. Granzow, D. Ibanez, M. Shephard. "Albany: Integrating Algorithmic Components to Build Advanced Applications". *SciDAC Principal Investigator Meeting*, Hyatt Regency Bethesda, Bethesda, MD (July 2015).
5. C. Jackson, J. Jakeman, **I. Tezaur**, S. Price, M. Eldred, P. Heimeback, M. Perego, A. Salinger, G. Stadler. "PISCEES: Ice Sheet Model Experiments for Evaluating Sea Level Rise". *SciDAC Principal Investigator Meeting*, Hyatt Regency Bethesda, Bethesda, MD (July 2015).
6. **I. Tezaur**, M. Perego, R. Tuminaro, A. Salinger, J. Jakeman, M. Eldred, L. Ju, T. Zhang, M. Gunzburger, S. Price. "Progress on the PISCEES FELIX Ice Sheet Dynamical Cores". *SciDAC Principal Investigator Meeting* , Hyatt Regency Bethesda, Bethesda, MD (July 2015).
7. **I. Tezaur**, A. Salinger, M. Perego, R. Tuminaro. "Component-Based Application Code Development, Part 2: Demonstration on a Land-Ice Model and Proposed Extension to Other Climate Components". *Advancing X-cutting Ideas for Computational Climate Science (AXICCS) 2016*, Rockville, MD (Sept. 2016).
8. W. Spotz, **I. Tezaur**, P. Bosler, J. Fike, O. Guba, T. Smith, J. Watkins, I. Demeshko. "A Performance Portable, High-Resolution Global Atmosphere Model". *American Geophysical Union (AGU) 2016 Fall Meeting*, San Francisco, CA (Dec. 2016).
9. L. Bertagna, M. Deakin, O. Guba, D. Sunderland, A. Salinger, **I. Tezaur**. "C++/Kokkos Refactor of the HOMME Dycore: CMDV Software", *ACME All-Hands Meeting,* Potomac, MD (June 2017).
10. A. Mota, **I. Tezaur**, C. Alleman. "The Schwarz alternating method for concurrent multiscale coupling in solid mechanics", *SIAM Conference on Parallel Processing for Scientific Computing (SIAM PP) 2018*, Tokyo, Japan (March 2018).
11. M. Perego, L. Bertagna, D. Martin, S. Price, M. Hoffman, **I. Tezaur**. "Probabilistic Sea-Level Projections from Ice Sheet and Earth System Models 1: Ice Sheet Model Development and Applications", *SciDAC Principal Investigator Meeting*, Rockville, MD (July 2018).
12. M. Perego, L. Bertagna, D. Martin, S. Price, M. Hoffman, **I. Tezaur**, J. Watkins, J. Jakeman. "Probabilistic Sea-Level Projections from Ice Sheet and Earth System Models 3: Performance, Optimization and Uncertainty Quantification", *SciDAC Principal Investigator Meeting*, Rockville, MD (July 2019).
13. **I. Tezaur**, J. Barnett, A. Mota, A. de Castro, P. Kuberry, P. Bochev, C. Wentland. "Component-based Coupling of First-Principles & Data-Driven Models". *Isaac Newton Institute Workshop on Computational Challenges and Emerging Tools (held as part of "The mathematical and statistical foundation of future & data-driven engineering" program).* Cambridge, UK, April 24-28, 2023.

14. **I. Tezaur**, P. Bochev, P. Kuberry, A. Gruber, C. Eldred, E. Parish, P. Blonigan. "Structurure-Presering Model Order Reduction (SP-MOR)", *MMICC-3 All-Hands Meeting,* Albuquerque, NM, Jan. 9-10, 2024.
15. **I. Tezaur**, P. Bochev, P. Kuberry, C. Wentland, J. Barnett, A. de Castro, E. Hawkins, J. Owen, E. Huynh. "Component-based coupling of first-principles and data-driven models", *MMICC-3 All-Hands Meeting,* Albuquerque, NM, Jan. 9-10, 2024.
16. A. Mota, J. Frederick, **I. Tezaur**, D. Bull, E. Bayat, C. Choens, B. Jones, C. Flanary. "Assessing permafrost demose and infrastructure destabilization using the Arctic Coastal Erosion (ACE) model", *Los Alamos-Sandia Climate Summit,* Los Alamos, NM. May 7, 2024.
17. A. Mota, J. Frederick, **I. Tezaur**, D. Bull, E. Bayat, C. Choens, B. Jones, C. Flanary. "Assessing permafrost demose and infrastructure destabilization using the Arctic Coastal Erosion (ACE) model", *European Seminar on COmputing (ESCO) 2024,* Pilsen, CZ. June 10-14, 2024.
18. **I. Tezaur**, A. Mota, A. Gruber, E. Parish, C. Wentland, I. Moore, T. Shelton, M. Merewether, K. Willcox, N. Aretz, K. Watts. Accelerating the analyst workflow: Adaptive Hybrid modEls via domAin Decomposition (AHEAD). *Sandia National Laboratories Engineering Sciences Research Foundation (ESRF) External Review Board (ERB)*, Albuquerque, NM, May 13-14, 2026.

SOFTWARE DEVELOPMENT

- **Albany multi-physics code.** Albany is an open-source multi-physics analysis package based on the Trilinos multiphysics framework housing a variety of application areas from climate modeling, to computational solid mechanics, to quantum device modeling. ***My role is that of lead developer and product owner.*** https://github.com/sandialabs/Albany
- **Arctic Coastal Erosion (ACE) model.** The ACE model is a first-of-its kind 3D finite element multi-physics model of Arctic permafrost that combines a finite deformation plasticity model with a model for the transient evolution of the permafrost's temperature and ice saturation, and is forced by realistic oceanic and atmospheric boundary conditions. ***I am a lead developer of ACE and the code that houses ACE, Albany-LCM.*** https://github.com/sandialabs/LCM
- **Norma.jl.** Norma is a Julia prototype for testing algorithms and ideas for coupling and multiphysics, primarily in solid mechanics and heat conduction. High-fidelity models as well as non-intrusive operator inference-based reduced order models (ROMs) are available. ***I am helping to develop the Schwarz coupling and contact capabilities in Norma.jl.*** https://github.com/sandialabs/Norma.jl
- **In-Situ Machine Learning (ISML).** ISML is a Python code that enables in-situ, unsupervised anomaly/event detection on exascale platforms using a communication-minimizing workflow comprised of *signatures*, *measures*, and *decisions* [Shead *et al.*, 2022]. ***I have orchestrated extensions of ISML to land ice, coupled climate and model reduction applications with unstructured, spatially-evolving meshes.*** https://github.com/sandialabs/isml
- **Community Ice Sheet Model (CISM).** CISM is a next-generation ice sheet model used to predict ice sheet retreat and sea-level rise in a warming climate, freely available as part of NCAR's Community Earth System Model (CESM). ***My role was to create an interface between CISM and the Albany Land-Ice Model (ALI), a Trilinos-based finite element model that greatly improved CISM's robustness and performance.*** https://github.com/cism/cism
- **Albany Land-Ice (ALI).** A next-generation finite-element land-ice model that serves as the land-ice component in the DOE's Energy Exascale Earth System Model. ***I am the original creator of ALI within the Albany code base, and have served as its performance lead.*** https://github.com/E3SM-Project/E3SM

- **Trilinos.** Trilinos is a suite of algorithms and enabling technologies within an object-oriented software framework for the solution of large-scale complex, multi-physics engineering and scientific problems on new and emerging HPC. ***I am a developer of the Tempus time-integration package in Trilinos, and a product owner of the Piro package for embedded nonlinear analysis.*** https://github.com/trilinos/Trilinos
- **SPARC (Sandia Parallel Aerodynamics and Reentry Code).** SPARC is a next-generation transonic and hypersonic CFD code developed at Sandia to support the aerodynamic, aerothermal and aerostructural simulation needs of the lab***. I helped integrate nonlinear solvers and time-integrators from Trilinos into SPARC.***
- **ALEGRA (Arbitrary Lagrangian-Eulerian General Research Applications).** ALEGRA is a next-generation large-deformation shock physics code at Sandia that is based on Arbitrary Lagrangian-Eulerian (ALE) formulation. ***I was a lead developer of the eXtended Finite Element Method (XFEM) capability in ALEGRA, which enables correct multi-material simulations for impact problems.***
- **Norma.jl.** A Julia open-source solid mechanics code for the prototyping and testing of algorithms and ideas for coupling and mechanical contact. ***I have contributed to the development and implementation of the Schwarz alternating method for multi-scale coupling and contact in Norma.jl.*** https://github.com/sandialabs/Norma.jl

PROFESSIONAL MEMBERSHIPS: Society for Industrial & Applied Mathematics (SIAM), SIAM Activity Group on Computational Science & Engineering, SIAM Activity Group on Geosciences, SIAM Activity Group on Mathematics of Planet Earth, SIAM Activity Group on Supercomputing, SIAM Activity Group on Uncertainty Quantification, Full Member of Sigma Xi Scientific Research Society (by nomination), Society of Women Engineers (SWE), American Geophysical Union (AGU), United States Association for Computational Mechanics (USACM), International Association for Computational Mechanics (IACM), Institute of Electrical and Electronics Engineers (IEEE) Computer Society.