

Maria Vasilyeva

Department of Mathematics and Statistics
Texas A&M University – Corpus Christi
Corpus Christi, TX 78414

maria.vasilyeva@tamucc.edu

Employment History

- **Assistant Professor in Applied Mathematics** 08/2021 – present
Department of Mathematics and Statistics, Texas A&M University-Corpus Christi, Corpus Christi, TX, USA
- **Senior Research Scientist** 02/2021 – 07/2021
Center of Innovation for Flow through Porous Media, University of Wyoming, Laramie, WY, USA
- **Postdoctoral Research Associate** 04/2015 – 01/2021
Institute for Scientific Computation, Texas A&M University, College Station, TX, USA
- **Researcher / Docent-Researcher** 2007 – 2015
North-Eastern Federal University, Yakutsk, Republic of Sakha (Yakutia), Russia
- **Software Engineer / Mathematician** 2007 – 2009
Ltd. SakhaInternet, Yakutsk, Republic of Sakha (Yakutia), Russia

Education

- PhD in Applied Mathematics, North-Eastern Federal University, Yakutsk, Russia 2012
Supervisor: Prof. Petr Vabishchevich (Lomonosov Moscow State University, Moscow, Russia)
Dissertation: *Mathematical modeling of multiphase filtration on high-performance computing systems.*
- MS in Applied Math. and Informatics, North-Eastern Federal University, Yakutsk, Russia 2008
- BS in Applied Math. and Informatics, North-Eastern Federal University, Yakutsk, Russia 2006

Journal Articles (Last 5 Years, * indicates student coauthor)

1. **M. Vasilyeva**, R. Pangilinan* (2026). *Operator Learning on the Data-Driven Multiscale Space for Nonlinear Flow in Random Heterogeneous Porous Media*. arXiv preprint arXiv:2606.25820. (Under Review)
2. **M. Vasilyeva**, Z. Wei, K. Gajamannage, H. Ji*, A. Krasnikov*, A. Sadovskii (2026). *Learning Ecological and Epidemic Processes using Neural ODEs, Kolmogorov–Arnold Network ODEs and SINDy*. arXiv preprint arXiv:2601.09811. (Under Review)
3. **M. Vasilyeva**, J. Brannick, B. S. Southworth (2026). *Multiscale Graph Reduction for Heterogeneous and Anisotropic Discrete Diffusion Processes*. arXiv preprint arXiv:2510.10894. (Under Review)
4. **M. Vasilyeva**, B. S. Southworth, S. Fu (2026). *An adaptive two-grid preconditioner and linearly implicit scheme for shale gas transport in fractured porous media*. *Computational Geosciences*, 30(4), 55.
5. **M. Vasilyeva**, B. S. Southworth, Y. He, M. Wang (2026). *Implicit-Explicit Scheme with Multiscale Vanka Two-Grid Solver for Heterogeneous Unsaturated Poroplasticity*. *Electronic Transactions on Numerical Analysis*, 66, 1-31.
6. **M. Vasilyeva**, N. A. Mbroghe, D. Spiridonov, T. Timofeeva (2026). *An implicit-explicit scheme and adaptive multiscale approximation of generalized Forchheimer flow in fractured porous media*. *Computers & Mathematics with Applications*, 211, 1-25.

7. **M. Vasilyeva**, G. Wimmer, B. S. Southworth (2025). *Multiscale approximation and two-grid preconditioner for extremely anisotropic heat flow*. *Journal of Computational Physics*, 538, 114201.
8. **M. Vasilyeva**, A. Krasnikov*, K. Gajamannage, M. Mehrubeoglu (2025). *Multiscale method for image denoising using nonlinear diffusion process: Local denoising and spectral multiscale basis functions*. *Journal of Computational and Applied Mathematics*, 470, 116733.
9. N. A. Mbroh, S. Stepanov, **M. Vasilyeva**, A. Sadovskii, H. Ji* (2025). *Multiscale scheme for a time-fractional multispecies reaction-diffusion model*. *Journal of Computational and Applied Mathematics*, 117251.
10. H. Ji*, **M. Vasilyeva**, N. A. Mbroh, A. Sadovskii (2025). *Epidemic dynamics in the spatio-temporal predator-prey model*. *Frontiers in Applied Mathematics and Statistics*, 11, 1642676.
11. K. Gajamannage, D. I. Jayatilake, **M. Vasilyeva** (2025). *Efficient and robust remote sensing image denoising – a manifold learning framework with randomized approximations*. *International Journal of Remote Sensing*, 46(12), 4455–4478.
12. **M. Vasilyeva** (2025). *Generalized Multiscale Finite Element Method for discrete network (graph) models*. *Journal of Computational and Applied Mathematics*, 457, 116275.
13. **M. Vasilyeva** (2024). *Implicit-Explicit schemes for decoupling multicontinuum problems in porous media*. *Journal of Computational Physics*, 519, 113425.
14. **M. Vasilyeva**, R. Coffin, and I. Pecher (2024). *Decoupled multiscale numerical approach for reactive transport in marine sediment column*. *Computer Methods in Applied Mechanics and Engineering*, 428, 117087.
15. **M. Vasilyeva**, S. M. Mallikarjunaiah (2024). *Generalized multiscale finite element treatment of a heterogeneous nonlinear strain-limiting elastic model*. *Multiscale Modeling & Simulation*, 22(1), 334–368.
16. D. Spiridonov and **M. Vasilyeva** (2024). *Non-local multi-continuum method (NLMC) for Darcy–Forchheimer flow in fractured media*. *Journal of Computational and Applied Mathematics*, 438, 115574.
17. **M. Vasilyeva**, N. A. Mbroh, M. Mehrubeoglu (2023). *Lower-Dimensional Model of the Flow and Transport Processes in Thin Domains by Numerical Averaging Technique*. *Fluids*, 9(1), 4.
18. R. Coffin, **M. Vasilyeva**, I. Pecher, D. McConnell (2023). *The Importance of Secondary Traps and Sinks in Offshore CO₂ Sequestration*. In *Offshore Technology Conference*, p. D011S002R009.
19. **M. Vasilyeva** (2023). *Efficient decoupling schemes for multiscale multicontinuum problems in fractured porous media*. *Journal of Computational Physics*, 487, 112134.
20. **M. Vasilyeva**, D. Spiridonov (2023). *Multiscale Model Reduction with Local Online Correction for Polymer Flooding Process in Heterogeneous Porous Media*. *Mathematics*, 11(14), 3104.
21. A. Tyrylgina, **M. Vasilyeva**, A. Alikhanov, D. Sheen (2023). *A computational macroscale model for the time fractional poroelasticity problem in fractured and heterogeneous media*. *Journal of Computational and Applied Mathematics*, 418, 114670.
22. **M. Vasilyeva**, S. Stepanov, A. Sadovskii, S. Henry* (2023). *Uncoupling techniques for multi-species diffusion–reaction model*. *Computation*, 11(8), 153.
23. U. Kalachikova, **M. Vasilyeva**, I. Harris, E. T. Chung (2023). *Generalized Multiscale Finite Element Method for scattering problem in heterogeneous media*. *Journal of Computational and Applied Mathematics*, 424, 114977.
24. **M. Vasilyeva**, A. Sadovskii, D. Palaniappan (2023). *Multiscale solver for multi-component reaction–diffusion systems in heterogeneous media*. *Journal of Computational and Applied Mathematics*, 427, 115150.
25. Y. Wang*, **M. Vasilyeva**, S. Stepanov, A. Sadovskii (2023). *Numerical investigation and factor analysis of two-species spatial-temporal competition system after catastrophic events*. *WSEAS*

- Transactions on Systems*, 22(1), 423–436.
26. **M. Vasilyeva**, S. M. Mallikarjunaiah, D. Palaniappan (2023). *Multiscale model reduction technique for fluid flows with heterogeneous porous inclusions*. *Journal of Computational and Applied Mathematics*, 424, 114976.
 27. D. Ammosov*, **M. Vasilyeva** (2023). *Online Multiscale Finite Element Simulation of Thermo-Mechanical Model with Phase Change*. *Computation*, 11(4), 71.
 28. **M. Vasilyeva**, Y. Wang*, S. Stepanov, A. Sadovski (2022). *Numerical investigation and factor analysis of the spatial-temporal multi-species competition problem*. *WSEAS Transactions on Mathematics*.
 29. A. Tyrylgina, S. Stepanov, D. Ammosov*, A. Grigorev, **M. Vasilyeva** (2022). *Partial Learning using Partially Explicit Discretization for Multicontinuum/Multiscale Problems with Limited Observation*. *Dual Continuum Heterogeneous Poroelastic Media Simulation*. *Mathematics*, 10(15), 2629.
 30. D. Ammosov*, Y. Efendiev, E. Grekova, **M. Vasilyeva** (2022). *Generalized macroscale model for Cosserat elasticity using Generalized Multiscale Finite Element Method*. *Journal of Computational Physics*, 461, 111011.
 31. D. Ammosov*, V. Vasil'ev, **M. Vasilyeva**, S. Stepanov (2022). *Multiscale model reduction for a thermoelastic model with phase change using a generalized multiscale finite-element method*. *Theoretical and Mathematical Physics*, 211(2), 595–610.
 32. A. Tyrylgina, **M. Vasilyeva**, A. Alikhanov, D. Sheen (2022). *A computational macroscale model for the time fractional poroelasticity problem in fractured and heterogeneous media*. *Journal of Computational and Applied Mathematics*, 418, 114670.
 33. D. Spiridonov, **M. Vasilyeva**, M. Wang, E. T. Chung (2022). *Mixed Generalized Multiscale Finite Element Method for flow problem in thin domains*. *Journal of Computational and Applied Mathematics*, 114577.
 34. D. Ammosov, **M. Vasilyeva**, E. T. Chung (2022). *Generalized Multiscale Finite Element Method for thermoporoelasticity problems in heterogeneous and fractured media*. *Journal of Computational and Applied Mathematics*, 407, 113995.
 35. E. T. Chung, U. Kalachikova, **M. Vasilyeva**, V. Alekseev* (2022). *Generalized multiscale discontinuous Galerkin method for convection–diffusion equation in perforated media*. *Mathematics and Computers in Simulation*, 193, 666–688.
 36. D. Ammosov, **M. Vasilyeva**, A. Nasedkin, Y. Efendiev (2022). *Generalized Multiscale Finite Element Method for piezoelectric problem in heterogeneous media*. *Engineering Analysis with Boundary Elements*, 135, 12–25.

Conference Papers (Last 5 Years, * indicates student coauthor)

-
1. **M. Vasilyeva**, A. Krasnikov*, H. Ji*, A. Sadovski. *Averaged Dynamics of Eco-Epidemic Processes on Graph*. In International Conference on Bioinformatics and Computational Biology (pp. 62-75). Cham: Springer Nature Switzerland.
 2. H. Ji*, **M. Vasilyeva**, A. Sadovski. *Predicting Equilibrium in a Predator–Prey System with Disease*. In International Conference on Bioinformatics and Computational Biology (pp. 76-92). Cham: Springer Nature Switzerland.
 3. Y. Wang*, **M. Vasilyeva**, A. Sadovski (2023). *Prediction of the survival status for multispecies competition system*. *AIP Conference Proceedings*, 2872(1).
 4. D. Palaniappan, **M. Vasilyeva** (2023). *Numerical approach for incompressible fluid flows in and around a pair of porous elliptic cylinders*. *AIP Conference Proceedings*, 2872(1).

Presentations and Workshops (Last 5 Years)

1. Operator Learning on the Data-Driven Multiscale Space for Nonlinear Flow in Random Heterogeneous Porous Media. *41st Colorado Conference On Iterative and Multigrid Methods*. June 21-26, 2026, Boulder, Colorado.
2. Accelerated local-global coupling for non-isothermal multiphase reactive flow in hydrate-bearing sediments. *27th Conference of the International Linear Algebra Society (ILAS 2026)*, May 18–22, 2026, Virginia Tech, Blacksburg, VA. **(Invited)**
3. Multiscale Graph Reduction for Discrete Diffusion. *The 10th Coastal Bend Mathematics & Statistics Conference*, April 18, 2026, Texas A&M University–Corpus Christi **Session Organizer & Speaker**
4. Averaged Dynamics of Eco-Epidemic Processes on Graph. *BICOB-2026: ISCA 18th International Conference on Bioinformatics and Computational Biology*, March 23-25, 2026, Hilton Waikiki Beach Resort & Spa, Honolulu.
5. Physics-guided Upscaling and Multiscale Solver for Highly Anisotropic Heat Flux in Fusion Plasmas. *FEM Rodeo 2026*, February 27-28, 2026, University of Texas at Austin
6. Learning Ecological and Epidemic Processes. *CBMS Conference: Research at the Interface of Applied Mathematics and Machine Learning*, Department of Mathematics, University of Houston, December 8–13, 2025.
7. Explicit-Implicit Scheme and Two-Grid Preconditioner for Nonlinear Flow in Fractured Porous. *SIAM Conference on Mathematical & Computational Issues in the Geosciences (GS25)*. October 14–17, 2025, Louisiana State UniversityBaton Rouge, Louisiana. **(Invited)**
8. Multiscale Graph Reduction for Heterogeneous and Anisotropic Discrete Diffusion Processes. *SIAM Texas–Louisiana Sectional Meeting*, September 26–28, 2025, The Oden Institute for Computational Engineering & Sciences, The University of Texas at Austin. Minisymposium: *Computational Methods for Multiscale and Multiphysics Problems*. **Session Organizer & Speaker**
9. A semi-supervised learning of upscaled multicontinuum models in high-contrast media. *AWM Research Symposium*, May 16–18, 2025, University of Wisconsin–Madison, Madison, Wisconsin. **(Invited)**
10. An upscaled multicontinuum representation of the discrete graph models in a high-contrast network. *NSF CompMath Meeting 2025*, May 8–9, 2025, University of Utah, Salt Lake City, Utah.
11. Multiscale two-grid preconditioner for diffusion processes in heterogeneous and anisotropic media. *22nd Copper Mountain Conference on Multigrid Methods*, April 13–17, 2025, Copper Mountain, Colorado.
12. Coarse grid approximation and two-grid preconditioner for problems in heterogeneous domain. *9th Coastal Bend Mathematics and Statistics Conference*, April 5, 2025, Texas A&M International University, Laredo, Texas.
13. Decoupling schemes for multiscale multicontinuum problems. *SIAM Conference on Computational Science and Engineering (CSE25)*, March 3–7, 2025, Fort Worth, Texas. **(Invited)**
14. Coarse-graining of the discrete model on graphs: upscaling and efficient solver. *ICERM: Fusing Theory and Practice of Graph Algorithms*, Feb. 20–22, 2025, ICERM, Providence, Rhode Island.
15. Multiscale methods for multicontinuum problems in fractured porous media. *SIAM Texas–Louisiana Section 7th Annual Meeting*, October 11–13, 2024, Baylor University, Texas. **Session Organizer & Speaker**
16. Learning macroscopic parameters in nonlinear nonlocal upscaling. *9th Annual Meeting of SIAM Central States Section*, October 5–6, 2024, Kansas City, Missouri. **(Invited)**
17. Multiscale solver for problems in heterogeneous and high-contrast domains and structures. *Sci-*

- entific Computing Seminar*, September 26, 2024, University of Houston, Houston, Texas. **(Invited)**
18. Decoupling schemes for multicontinuum problems in fractured porous media. *AMS Fall Central Sectional Meeting*, September 14–15, 2024, University of Texas at San Antonio, Texas.
 19. Multiscale model order reduction for applied problems in heterogeneous media. *Mathematics Seminar Series*, September 13, 2024, University of the West Indies, Mona Campus, Jamaica. **(Invited)**
 20. Multiscale model order reduction for network models. *International Conference on Applied Mathematics 2024*, City University of Hong Kong, May 28 – June 1, 2024. **(Invited)**
 21. Multiscale model order reduction for applied problems in heterogeneous media and structures. *Workshop on Scale Bridging in Numerical Simulation*, Los Alamos National Laboratory, April 22–26, 2024. **(Invited)**
 22. Decoupling schemes for multiscale multicontinuum problems. *Mathematical Sciences Spring 2024 Colloquium Series*, UTEP, El Paso, April 5, 2024. **(Invited)**
 23. Multiscale finite element method for spatial network models. *31st Joint NMSU/UTEP Workshop*, NMSU, Las Cruces, April 6, 2024.
 24. Numerical upscaling of network models using PETSc. *2023 Annual PETSc Meeting*, June 2023, Chicago, Illinois.
 25. Splitting schemes for multiscale multicontinuum problems in fractured porous media. *InterPore 2023*, May 2023, Online.
 26. Coastal temporal–spatial systems of multi-species interactions: Impact of the diffusion and the initial conditions on the time needed to reach the equilibrium. *Gulf of Mexico Conference 2022 (GoMCon)*, April 2022, Baton Rouge, Louisiana.
 27. Impact of the system parameters on the restoration time for coastal multi-species habitats after catastrophic events. *Gulf of Mexico Conference 2022 (GoMCon)*, April 2022, Baton Rouge, Louisiana.
 28. Numerical solution of the thermo-hydro-mechanical model with phase change with application to hydrate simulations and permafrost problems. *Texas Women in Math Symposium (TWIMS)*, February 2022, Rice University, Houston, Texas.

Teaching

- **Natural Systems Modeling (DASC-5325)**
Spring 2026.
- **Discrete Mathematics (MATH-2305)**
Spring 2026.
- **Linear Algebra (MATH-3311)**
Fall 2025; Spring 2025; Fall 2024; Spring 2024; Fall 2023; Spring 2023; Fall 2022.
- **Numerical Methods for Data Science (DASC-5308)**
Fall 2025; Fall 2024.
- **Numerical Linear Algebra (MATH-5333)**
Spring 2025; Spring 2023.
- **Numerical Analysis (MATH-5339)**
Spring 2024; Fall 2022.
- **Numerical Methods for Partial Differential Equations with Python (MATH-5390)**
Fall 2023.
- **Theory and Applications of Partial Differential Equations (MATH-5337)**
Spring 2022.
- **Advanced Topic – Big Data Blitz (CMSS-590 / CMSS-6590)** (Guest Instructor)

- Summer 2026 (Week 8: Supervised and unsupervised learning);
- Summer 2025 (Week 7: Clustering, Linear Regression, Optimization, Deep Learning);
- Summer 2024 (Week 4: Numerical methods for data analysis);
- Summer 2023 (Week 3: Introduction to Python programming for data analysis).

Professional Activities

Editorial Roles

- Associate Editor: *Journal of Computational and Applied Mathematics*.
- Special Issue Editor: “*Analysis and Applications of Discontinuous Galerkin Methods in Wave-Propagation Problems*,” MDPI *Mathematics*.

Graduate Students Advised

- Hyangim Ji, Doctoral Dissertation Chair, PENS CMSS, Texas A&M University-Corpus Christi (Spring 2026).
- Youwen Wang, Doctoral Dissertation Co-Chair, PENS CMSS, Texas A&M University-Corpus Christi (Fall 2024).
- Stephen Henry, Master’s Thesis Co-Chair, Department of Mathematics and Statistics, Texas A&M University-Corpus Christi (Spring 2023).

Referee for Journals

- *Computer Methods in Applied Mechanics and Engineering*, *Journal of Computational Physics*, *Proceedings of the Royal Society A*, *Journal of Computational and Applied Mathematics*, *Water Resources Research*, *Computational Methods in Applied Mathematics*, *Computational Geosciences*, *International Journal for Numerical Methods in Fluids*, *Mathematics and Computers in Simulation*, *Zeitschrift für Angewandte Mathematik und Mechanik*, *International Journal for Numerical and Analytical Methods in Geomechanics*, *Applied Mathematics and Computation*, *Communications in Computational Physics*, *Journal of Natural Gas Science and Engineering*, *Journal of Petroleum Science and Engineering*, *Journal of Computational Mathematics*, *Journal of Scientific Computing*, *SPE Journal*, *Computers & Structures*, *International Journal of Heat and Mass Transfer*, *International Journal of Multiphase Flow*, *Composite Structures*, *Geophysics*, *Energies*, *Advances in Water Resources*, *Applied Energy*, *Multiscale Modeling & Simulation*, *International Journal of Solids and Structures*, etc.

Conference and Seminar Organization

- Co-organizer, Department of Mathematics and Statistics Seminar, TAMUCC, 2024–2026.
- Mini-Symposium Session Organizer (with Siu Wun Cheung) AM Texas–Louisiana Section, “Computational Methods for Multiscale and Multiphysics Problems,” September 26–28, 2025, University of Texas at Austin, Texas.
- Mini-Symposium Session Organizer (with Son-Young Yi and Sanghyun Lee), SIAM Texas–Louisiana Section, “Recent Advancements in Numerical Methods for Subsurface Simulations,” October 11–13, 2024, Baylor University, Texas.
- Co-organizer and Session Organizer, 6th Coastal Bend Mathematics & Statistics Conference, TAMUCC, April 9, 2022 (online).

Professional Service

- Netherlands Organisation for Scientific Research (NWO) Talent Programme — Reviewer (2026).
- Department of Energy, ASCR — Panelist (2025).
- National Science Foundation, DMS — Panelist (2025).
- General Research Fund, Hong Kong — Reviewer (2025).
- Office of Student Research, S-RISE Student Projects Review, TAMUCC — Reviewer (2024).
- Dutch Research Council, Applied and Engineering Sciences — Reviewer (2024).
- Search Committee Member, TAMUCC (2022–2023, 2025–2026).

Research Proposals and Grants

Active:

- *NRT-HDR: Stakeholder-Guided Environmental Science (STAGES)* (Senior Personnel, PI: Dorina Murgulet, active). National Science Foundation, 05/01/2022 – 04/30/2027, \$2,000,000
- *Engaged Student Learning Off Campus: Hands-on Distance Learning in Engineering and Computer Science through Internet of Things* (Co-PI, PI: Ruby Mehrubeoglu, active). National Science Foundation, 02/01/2021 – 01/31/2027, \$299,999
- Gene Golub SIAM Summer School (G^2S^3) 2027: Nonlinear Solvers and Preconditioning Techniques for Multiphysics PDEs (Co-organizer, Host: TAMUCC), SIAM, 06/14/2026 – 06/25/2026, 2027, \$183,640