

# Tyler H. Chang – CV

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## LIST OF PUBLICATIONS

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### Publications In-Press

2. G. Chen, **T. H. Chang**, J. Power, and C. Jing. An integrated multi-physics optimization framework for particle accelerator design. To appear in 2023 Winter Simulation Conference (WSC 2023), Industrial Applications Track. **doi**: 10.48550/arXiv.2311.09415
1. M. Garg<sup>1</sup>, **T. H. Chang**, and K. Raghavan. SF-SFD: Stochastic optimization of Fourier coefficients for space-filling designs. To appear in 2023 Winter Simulation Conference (WSC 2023). Preprint: <https://arxiv.org/abs/2305.12043>.

### Publications Under Review

3. R. Egele, **T. H. Chang**, Y. Sun, V. Vishwanath, and P. Balaprakash. Parallel multi-objective hyperparameter optimization with uniform normalization and bounded objectives. Submitted Dec 2023. Preprint: <https://arxiv.org/abs/2309.14936>.
2. **T. H. Chang**, L. T. Watson, S. Leyffer, T. C. H. Lux, and H. Almohri. Remark on Algorithm 1012: computing projections with large data sets. Submitted Oct 2023. Preprint available upon request.
1. **T. H. Chang** and S. M. Wild. Designing a framework for solving multiobjective simulation optimization problems. Submitted Jul 2023. Preprint: <https://arxiv.org/abs/2304.06881>.

### Publications In Preparation (Submission Imminent)

2. **T. H. Chang**, A. K. Gillette, and R. Maulik. Leveraging interpolation models and error bounds for verifiable scientific machine learning. First draft completed, preliminary results shown in Research Statement.
1. **T. H. Chang**. Computing the Delaunay graph in high dimensions. First draft completed.

### Peer-Reviewed Journal Articles

10. 2023. T. C. H. Lux, L. T. Watson, **T. H. Chang**, and W. I. Thacker. Algorithm 1031: MQSI—Monotone quintic spline interpolation. *ACM Transactions on Mathematical Software* 49(1), Article 6, 17 pages. **doi**: 10.1145/3570157
9. 2023. **T. H. Chang** and S. M. Wild. ParMOO: a Python library for parallel multiobjective simulation optimization. *Journal of Open Source Software* 8(82), Article 4468, 5 pages. **doi**: 10.21105/joss.04468
8. 2023. N. Neveu, **T. H. Chang**, P. Franz, S. Hudson, and J. Larson. Comparison of multiobjective optimization methods for the LCLS-II photoinjector. *Computer Physics Communication* 283, Article 108566, 10 pages. **doi**: 10.1016/j.cpc.2022.108566
7. 2023. Y. Wang, L. Xu, Y. Hong, R. Pan, **T. H. Chang**, T. C. H. Lux, J. Bernard, L. T. Watson, and K. W. Cameron. Design strategies and approximation methods for high-performance computing variability management. *Journal of Quality Technology* 55(1), pp. 88–103. **doi**: 10.1080/00224065.2022.2035285
6. 2022. **T. H. Chang**, L. T. Watson, J. Larson, N. Neveu, W. I. Thacker, S. Deshpande, and T. C. H. Lux. Algorithm 1028: VTMO: Solver for blackbox multiobjective optimization problems. *ACM Transactions on Mathematical Software* 48(3), Article 36, 34 pages. **doi**: 10.1145/3529258
5. 2021. L. Xu, T. C. H. Lux, **T. H. Chang**, B. Li, Y. Hong, L. T. Watson, A. R. Butt, D. Yao, and K. W. Cameron. Prediction of high-performance computing input/output variability and its application to optimization for system configurations. *Quality Engineering* 33(2), pp. 318–334. **doi**: 10.1080/08982112.2020.1866203
4. 2021. T. C. H. Lux, L. T. Watson, **T. H. Chang**, J. Bernard, B. Li, L. Xu, G. Back, A. R. Butt, K. W. Cameron, and Y. Hong. Interpolation of sparse high-dimensional data. *Numerical Algorithms* 88(1), pp. 281–313. **doi**: 10.1007/s11075-020-01040-2
3. 2020. **T. H. Chang**, L. T. Watson, T. C. H. Lux, A. R. Butt, K. W. Cameron, and Y. Hong. Algorithm 1012: DELAUNAYSPARSE: Interpolation via a sparse subset of the Delaunay triangulation in medium to high dimensions. *ACM Transactions on Mathematical Software* 46(4), Article 38, 20 pages. **doi**: 10.1145/3422818

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<sup>1</sup>= NSF MSGI (PhD student intern) at Argonne in my supervision

2. 2020. L. Xu, Y. Wang, T. C. H. Lux, **T. H. Chang**, J. Bernard, B. Li, Y. Hong, K. W. Cameron, and L. T. Watson. Modeling I/O performance variability in high-performance computing systems using mixture distributions. *Journal of Parallel and Distributed Computing* 139, pp. 87–98. **doi**: 10.1016/j.jpdc.2020.01.005
1. 2019. **T. H. Chang**, T. C. H. Lux, and S. S. Tipirneni. Least-squares solutions to polynomial systems of equations with quantum annealing. *Quantum Information Processing* 18(12), Article 374, 17 pages. **doi**: 10.1007/s11128-019-2489-x

## Peer-Reviewed Conference and Workshop Papers

13. 2023. **T. H. Chang**, J. R. Elias, S. M. Wild, S. Chaudhuri, and J. A. Libera. A framework for fully autonomous design of materials via multiobjective optimization and active learning: challenges and next steps. In *11th Intl. Conf. on Learning Representation (ICLR 2023), Workshop on Machine Learning for Materials (ML4Materials)*. Kigali, Rwanda. **url**: <https://openreview.net/forum?id=8KJS7RPjMqG>
12. 2020. **T. H. Chang**, J. Larson, and L. T. Watson. Multiobjective optimization of the variability of the high-performance Linpack solver. In *Proc. 2020 Winter Simulation Conference (WSC 2020)*, pp. 3081–3092. Orlando, FL, USA. **doi**: 10.1109/WSC48552.2020.9383875
11. 2020. **T. H. Chang**, J. Larson, L. T. Watson, and T. C. H. Lux. Managing computationally expensive blackbox multiobjective optimization problems with libEnsemble. In *Proc. 2020 Spring Simulation Conference (SpringSim '20)*, Article 31, 12 pages. Fairfax, VA, USA. **doi**: 10.22360/springsim.2020.hpc.001
10. 2020. T. C. H. Lux, L. T. Watson, **T. H. Chang**, L. Xu, Y. Wang, and Y. Hong. An algorithm for constructing monotone quintic interpolating splines. In *Proc. 2020 Spring Simulation Conference (SpringSim '20)*, Article 33, 12 pages. Fairfax, VA, USA. **doi**: 10.22360/springsim.2020.hpc.003
9. 2020. T. C. H. Lux and **T. H. Chang**. Analytic test functions for generalizable evaluation of convex optimization techniques. In *Proc. IEEE SoutheastCon 2020*, 8 pages. Raleigh, NC, USA. **doi**: 10.1109/SoutheastCon44009.2020.9368254
8. 2020. T. C. H. Lux, L. T. Watson, **T. H. Chang**, L. Xu, Y. Wang, J. Bernard, Y. Hong, and K. W. Cameron. Effective nonparametric distribution modeling for distribution approximation applications. In *Proc. IEEE SoutheastCon 2020*, 6 pages. Raleigh, NC, USA. **doi**: 10.1109/SoutheastCon44009.2020.9368295
7. 2018. **T. H. Chang**, L. T. Watson, T. C. H. Lux, S. Raghvendra, B. Li, L. Xu, A. R. Butt, K. W. Cameron, and Y. Hong. Computing the umbrella neighbourhood of a vertex in the Delaunay triangulation and a single Voronoi cell in arbitrary dimension. In *Proc. IEEE SoutheastCon 2018*, 8 pages. St. Petersburg, FL, USA. **doi**: 10.1109/SECON.2018.8479003
6. 2018. T. C. H. Lux, L. T. Watson, **T. H. Chang**, J. Bernard, B. Li, X. Yu, L. Xu, G. Back, A. R. Butt, K. W. Cameron, Y. Hong, and D. Yao. Nonparametric distribution models for predicting and managing computational performance variability. In *Proc. IEEE SoutheastCon 2018*, 7 pages. St. Petersburg, FL, USA. **doi**: 10.1109/SECON.2018.8478814
5. 2018. **T. H. Chang**, L. T. Watson, T. C. H. Lux, J. Bernard, B. Li, L. Xu, G. Back, A. R. Butt, K. W. Cameron, and Y. Hong. Predicting system performance by interpolation using a high-dimensional Delaunay triangulation. In *Proc. 2018 Spring Simulation Conference (SpringSim '18)*, Article 2, 12 pages. Baltimore, MD, USA. **doi**: 10.22360/springsim.2018.hpc.003
4. 2018. T. C. H. Lux, L. T. Watson, **T. H. Chang**, J. Bernard, B. Li, L. Xu, G. Back, A. R. Butt, K. W. Cameron, and Y. Hong. Predictive modeling of I/O characteristics in high performance computing systems. In *Proc. 2018 Spring Simulation Conference (SpringSim '18)*, Article 8, 10 pages. Baltimore, MD, USA. **doi**: 10.22360/springsim.2018.hpc.009
3. 2018. **T. H. Chang**, L. T. Watson, T. C. H. Lux, B. Li, L. Xu, A. R. Butt, K. W. Cameron, and Y. Hong. A polynomial time algorithm for multivariate interpolation in arbitrary dimension via the Delaunay triangulation. In *Proc. 2018 ACM Southeast Conference (ACMSE '18)*, Article 12, 8 pages. Richmond, KY, USA. **doi**: 10.1145/3190645.3190680
2. 2018. T. C. H. Lux, L. T. Watson, **T. H. Chang**, J. Bernard, B. Li, X. Yu, L. Xu, G. Back, A. R. Butt, K. W. Cameron, D. Yao, and Y. Hong. Novel meshes for multivariate interpolation and approximation. In *Proc. 2018 ACM Southeast Conference (ACMSE '18)*, Article 13, 7 pages. Richmond, KY, USA. **doi**: 10.1145/3190645.3190687
1. 2017. C. Raghunath, **T. H. Chang**, L. T. Watson, M. Jrad, R. K. Kapania, and R. M. Kolonay. Global deterministic and stochastic optimization in a service oriented architecture. In *Proc. 2017 Spring Simulation Conference (SpringSim '17)*, Article 7, 12 pages. Virginia Beach, VA, USA. **doi**: 10.22360/springsim.2017.hpc.023

## Technical Reports and Dissertations

5. 2023. **T. H. Chang**, S. M. Wild, and H. Dickinson<sup>2</sup>. *ParMOO: Python library for parallel multiobjective simulation optimization*. Technical Report Version 0.3.1. Argonne National Laboratory, Lemont, Illinois, USA. **url**: [https://parmoo.readthedocs.io/\\_/downloads/en/latest/pdf/](https://parmoo.readthedocs.io/_/downloads/en/latest/pdf/)

<sup>2</sup>= DOE SULI (undergraduate intern) at Argonne in my supervision

4. 2020. A. K. Gillette and **T. H. Chang**. *ALGORITHMS: assessing latent space dimension by Delaunay loss*. Technical Report LLNL-CONF-814930. Lawrence Livermore National Laboratory, Livermore, California, USA. **url** : <https://www.osti.gov/servlets/purl/1756748>
3. 2020. **T. H. Chang**. *Mathematical software for multiobjective optimization problems*. Ph.D. Dissertation. Department of Computer Science, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA, USA. **Dept. of Computer Science Nominee for Outstanding Dissertation Award**. **url** : <http://hdl.handle.net/10919/98915>
2. 2016. **T. H. Chang**. *GPU saturation for multiple matrix-vector multiplications*. Bachelor's Thesis. Department of Computer Science, Virginia Wesleyan University, Virginia Beach, VA, USA.
1. 2015. **T. H. Chang**. *Implementing the optimal control-based obstacle avoidance (OCA) algorithm in compiled code*. In ARL Summer Student Research Symposium Compendium of Abstracts vol. 2, ARL-TM-2015A. US Army Research Laboratory, Adelphi, MD, USA. **url** : <https://apps.dtic.mil/sti/pdfs/AD1000355.pdf>