Rio Yokota

CONTACT INFORMATION

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RESEARCH INTERESTS

High performance computing; Large Scale Deep Learning; Numerical Analysis

EDUCATION

Keio University, Yokohama, Japan

Ph.D., Mechanical Engineering, July, 2009

- Dissertation Topic: "Validation of Vortex Methods as a Direct Numerical Simulation of Turbulence"
- Advisor: Shinnosuke Obi

HONORS AND AWARDS

ACM Gordon Bell prize, price/performance (2009)

ACADEMIC EXPERIENCE

4/2025 -	Team Principal, RIKEN
10/2024 -	Professor, Institute of Science Tokyo
4/2024 -	Scientific Director, National Institute of Informatics
1/2023 - 9/2024	Professor, Tokyo Institute of Technology
4/2015 - 12/2022	Associate Professor, Tokyo Institute of Technology
9/2011 - 3/2015	Research Scientist, KAUST
9/2010 - 8/2011	Post-doctoral Researcher, Boston University
2/2009 - 8/2010	Post-doctoral Researcher, University of Bristol

BOOK CHAPTERS

1. R. Yokota, M. AbdulJabbar, *N*-body methods on Xeon Phi coprocessors, *High Performance Parallelism Pearls* (2014)
2. R. Yokota and L. A. Barba, Treecode and fast multipole method for N-body simulation with CUDA, *GPU Computing Gems* (2011)

PEER REVIEWED JOURNALS

1. Satoshi Yui, Hiromichi Kobayashi, Makoto Tsubota, Rio Yokota, Quantum turbulence coupled with externally driven normal-fluid turbulence in counterflow of superfluid ^{4}He, Journal of the Physical Society of Japan, 94, 043601 (2025).
2. Takuya Akiba, Makoto Shing, Yujin Tang, Qi Sun, David Ha, Evolutionary Optimization of Model Merging Recipes, *Nature Machine Intelligence* (2025).
3. Kenta Niwa, Hiro Ishii, Hiroshi Sawada, Akinori Fujino, Noboru Harada, Rio Yokota, ,Natural Gradient Primal-Dual Method for Decentralized Learning, Transactions on Signal and Information Processing over Networks, (2024).

4. Qianxiang Ma, Rio Yokota, An Inherently Parallel $\mathcal{H}^2$-ULV Factorization for Solving Dense Linear Systems on GPUs, International Journal of High Performance Computing Applications, (2024).
5. Hiroyuki Ootomo, Katsuhisa Ozaki, Rio Yokota, DGEMM on Integer Matrix Multiplication Unit, International Journal of High Performance Computing Applications, (2024).
6. Erik Daxberger, Siddharth Swaroop, Kazuki Osawa, Rio Yokota, Richard E. Turner, Jose Miguel Hernandez-Lobato, Mohammad Emtiyaz Khan, Improving Continual Learning by Accurate Gradient Reconstructions of the Past, Transactions on Machine Learning Research, (2023).
7. Hiroki Naganuma, Kartik Ahuja, Shiro Takagi, Tetsuya Motokawa, Rio Yokota, Kohta Ishikawa, Ikuro Sato, Ioannis Mitliagkas, Empirical Study on Optimizer Selection for Out-of-Distribution Generalization, *Transactions on Machine Learning Research*, (2023).
8. Sameer Deshmukh, Rio Yokota, George Bosilca, Cache Optimization and Performance Modeling of Batched, Small, and Rectangular Matrix Multiplication on Intel, AMD, and Fujitsu Processors, *ACM Transactions on Mathematical Software*, (2023).
9. Muhammad Ridwan Apriansyah, Rio Yokota, Parallel QR Factorization of Block Low-Rank Matrices, *ACM Transactions on Mathematical Software*, (2022). https://doi.org/10.1145/3538647
10. Hiroyuki Ootomo, Rio Yokota, Recovering Single Precision Accuracy from Tensor Cores While Surpassing the FP32 Theoretical Peak Performance, *The International Journal of High Performance Computing Application*, (2022).
11. Tingyu Wang, Rio Yokota, Lorena A. Barba, ExaFMM: a high-performance fast multipole method library with C++ and Python interfaces, *The Journal of Open Source Software*, Vol. 6, No. 61, pp. 3145 (2021).
12. Kazuki Osawa, Yohei Tsuji, Yuichiro Ueno, Akira Naruse, Chuan-Sheng Foo, Rio Yokota, Scalable and Practical Natural Gradient for Large-Scale Deep Learning, *IEEE Transactions on Pattern Analysis and Machine Intelligence* (2020); PP:10.1109/TPAMI.2020.3004354.
13. Davoud S. Shamshirgar, Rio Yokota, Anna-Karin Tornberg, and Berk Hess, Regularizing the Fast Multipole Method for use in Molecular Simulation, *The Journal of Chemical Physics*, 151, 234113 (2019)
14. Akihiro Ida, Hiroshi Nakashima, Tasuku Hiraishi, Ichitaro Yamazaki, Rio Yokota, Takeshi Iwashita, QR Factorization of Block Low-rank Matrices with Weak Admissibility Condition, *Journal of Information Processing*, Vol. 12, No. 4 (2019)
15. Ichitaro Yamazaki, Akihiro Ida, Rio Yokota, Jack Dongarra, Distributed Memory Lattice H-matrix Factorization, *The International Journal of High Performance Computing Applications* (2019).
16. Mustafa Abduljabbar, Mohammed Al Farhan, Noha Al-Harthi, Rui Chen, Rio Yokota, Hakan Bagci, David Keyes, Extreme Scale FMM-Accelerated Boundary Integral Equation Solver for Wave Scattering, *SIAM Journal on Scientific Computing*, Vol. 41, No. 3, pp. C245–C268 (2019).
17. Naoya Maruyama, Takayuki Aoki, Kenjiro Taura, Rio Yokota, Mohamed Wahib, Motohiko Matsuda, Keisuke Fukuda, Takashi Shimokawabe, Naoyuki Onodera, Michel Müller, Shintaro Iwasaki, Highly Productive, High-Performance Application Frameworks for Post-Petascale Computing, *Advanced Software Technologies for Post-Peta Scale Computing*, pp. 77–98 (2018)
18. Rio Yokota, Huda Ibeid, David Keyes, Fast Multipole Method as a Matrix-Free Hierarchical Low-Rank Approximation *Lecture Notes in Computational Science and Engineering, Springer*, Vol. 117, pp. 227-244 (2017)
19. Huda Ibeid, Rio Yokota, Jennifer Pestana, David Keyes, Fast Multipole Preconditioners for Sparse Matrices Arising from Elliptic Equations, *Computing and Visualization in Science* (2017). https://doi.org/10.1007/s00791-017-0287-5

20. Rio Yokota, Communication Optimization of Distributed Memory FMM for Large Scale Boundary Element Methods, *Simulation*, Vol. 35, No. 3, pp. 23–29 (2016)
21. Rio Yokota, Tradeoff between FMM and $\mathcal{H}^2(HSS)$-matrices, *Journal of the Japan Society for Computational Engineering and Science*, Vol. 21, No. 4, pp. 3498–3501 (2016)
22. Julio E. Castrillon-Candas, Marc G. Genton, Rio Yokota, Multi-level Restricted Maximum Likelihood Covariance Estimation and Kriging for Large Non-gridded Spatial Datasets, *Spatial Statistics*, Vol. 18, pp. 105–124 (2016)
23. Huda Ibeid, Rio Yokota, David Keyes, A Performance Model for the Communication in Fast Multipole Methods on HPC Platforms, *International Journal of High Performance Computing Applications*, Vol. 30, No. 4, pp. 423–437 (2016)
24. Abdelhalim Amer, Satoshi Matsuoka, Miquel Pericàs, Naoya Maruyama, Kenjiro Taura, Rio Yokota, Pavan Balaji, Scaling FMM with Data-Driven OpenMP Tasks on Multicore Architectures, *Lecture Notes in Computer Science*, Vol. 9903 LNCS, pp. 156–170 (2016).
25. Rio Yokota, George Turkiyyah, David Keyes, Communication Complexity of the Fast Multipole Method and its Algebraic Variants, *Supercomputing Frontiers and Innovations*, Vol. 1, No. 1, pp. 63–84 (2014)
26. Yousuke Ohno, Rio Yokota, Hiroshi Koyama, Gentaro Morimoto, Aki Hasegawa, Gen Masumoto, Noriaki Okimoto, Yoshinori Hirano, Huda Ibeid, Tetsu Narumi, Makoto Taiji, Petascale Molecular Dynamics Simulation Using the Fast Multipole Method on K Computer, *Computer Physics Communications*, Vol. 185, No. 10, pp. 2575–2585 (2014)
27. Hatem Ltaief, Rio Yokota, Data-Driven Execution of Fast Multipole Methods, *Concurrency and Computation: Practice and Experience*, Vol. 26, No. 11, pp. 1935–1946 (2014)
28. Rio Yokota, An FMM Based on Dual Tree Traversal for Many-Core Architectures, *Journal of Algorithms and Computational Technology*, Vol. 7, No. 3, pp. 301–324 (2013)
29. Rio Yokota, Lorena A. Barba, Tetsu Narumi, Kenji Yasuoka, Petascale Turbulence Simulation Using a Highly Parallel Fast Multipole Method, *Computer Physics Communications*, Vol. 184, No. 3, pp. 445–455 (2013)
30. Rio Yokota, Lorena A. Barba, FMM-based Vortex Method for Simulation of Isotropic Turbulence on GPUs, Compared with a Spectral Method, *Computers and Fluids*, Vol. 80, pp. 17–27 (2013)
31. Rio Yokota, Lorena A. Barba, A Tuned and Scalable Fast Multipole Method as a Preeminent Algorithm for Exascale Systems, *International Journal of High Performance Computing Applications*, Vol. 26, No. 4, pp. 337-346 (2012)
32. Rio Yokota, FMM Tree Construction on GPUs, *Ensemble*, Vol. 14, No. 2, pp. 85–89 (2012)
33. Rio Yokota, Lorena A. Barba, Hierarchical N-body Simulations with Auto-tuning for Heterogeneous Systems, *Computing in Science and Engineering*, Vol. 14, No. 3, pp. 30–39 (2012)
34. Rio Yokota, Jaydeep P. Bardhan, Matthew G. Knepley, Lorena A. Barba, Tsuyoshi Hamada, Biomolecular Electrostatics Using a Fast Multipole BEM on up to 512 GPUs and a Billion Unknowns, *Computer Physics Communications*, Vol. 182, No. 6, pp. 1272–1283 (2011)
35. Rio Yokota and Lorena A. Barba, Comparing the Treecode with FMM on GPUs for Vortex Particle Simulations of a Leapfrogging Vortex Ring, *Computers and Fluids*, Vol. 45, No. 1, pp. 155–161 (2011)
36. Rio Yokota and Shinnosuke Obi, Vortex Methods for the Simulation of Turbulent Flows, *Journal of Fluid Science and Technology*, Vol. 6, No. 1, pp.14–29 (2011)
37. Rio Yokota and Tsuyoshi Hamada, N-body Simulation and FMM on the Large-scale GPU Cluster at Nagasaki University, *Journal of the Japan Society for Computational Engineering and Science*, Vol. 15, No. 4 (2010)

38. Rio Yokota and Shinnosuke Obi, Comparing Vortex Methods and Finite Difference Methods in a Homogeneous Turbulent Shear Flow, *International Journal for Numerical Methods in Fluids*, Vol. 63, No. 7, pp. 828–846. (2010)
39. Rio Yokota, Lorena A. Barba, and Matthew G. Knepley, PetRBF–A Parallel O(N) Algorithm for Radial Basis Function Interpolation with Gaussians, *Computer Methods in Applied Mechanics and Engineering*, Vol. 199, No. 25-28, pp. 1793–1804. (2010)
40. Rio Yokota, Tetsu Narumi, Ryuji Sakamaki, Shun Kameoka, Shinnosuke Obi, and Kenji Yasuoka, Fast Multipole Methods on a Cluster of GPUs for the Meshless Simulation of Turbulence, *Computer Physics Communications*, Vol. 180, No. 11, pp. 2066–2078. (2009)
41. Tarun K. Sheel, Rio Yokota, Kenji Yasuoka, and Shinnosuke Obi, The Study of Colliding Vortex Rings Using a Special-Purpose Computer and FMM, *Transactions of the Japan Society for Computational Engineering and Science*, 20080003 (2008).
42. Rio Yokota, Tarun K. Sheel, and Shinnosuke Obi, Calculation of Isotropic Turbulence Using a Pure Lagrangian Vortex Method, *Journal of Computational Physics*, Vol. 226, pp.1589–1606. (2007)

Conference Proceedings (peer-reviewed)

1. Daisuke Nohara, Taishi Nakamura, Rio Yokota, Monotonic and Non-Monotonic Length-Performance Relationships in Reasoning RL, ICML 2026 Workshop AdaptFM, Jul. 2026.
2. Satoki Ishikawa, Sameer Satish Deshmukh, Sakina Fatima, Takumi Honda, Rio Yokota, Loss and Optimizer as Two Essential Mechanisms Behind Knowledge Distillation, ICML Workshop HiLD, Jul. 2026.
3. Masaki Kawamura, Nakamasa Inoue, Rintaro Yanagi, Hirokatsu Kataoka, Rio Yokota, PowerCLIP: Powerset Alignment for Fine-Grained Contrastive Pre-Training, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Jun. 2026.
4. Akiko Aizawa, Yuki Arase, Fei Cheng, Jiahao Huang, Zhiyi Huang, Junfeng Jiang, Teruhito Kanazawa, Daisuke Kawahara, Kazuma Kobayashi, Takashi Kodama, Sadao Kurohashi, Yusuke Oda, Yuma Tsuta, Zhen Wan, Zhishen Yang, Rio Yokota, Building Effective Japanese Medical LLMs with an Open Recipe for Domain Adaptation through Continued Pre-training, International Conference on Language Resources and Evaluation (LREC), May 2026.
5. Taishi Nakamura, Satoki Ishikawa, Masaki Kawamura, Takumi Okamoto, Daisuke Nohara, Jun Suzuki, Rio Yokota, Optimal Sparsity of Mixture-of-Experts Language Models for Reasoning Tasks, International Conference on Learning Representations (ICLR), Apr. 2026.
6. Kazuki Fujii, Yukito Tajima, Sakae Mizuki, Masaki Kawamura, Hinari Shimada, Taihei Shiotani, Koshiro Saito, Masanari Oi, Taishi Nakamura, Takumi Okamoto, Shigeki Ishida, Kakeru Hattori, Youmi Ma, Hiroya Takamura, Rio Yokota, Jun Sakuma, Naoaki Okazaki, Rewriting Pre-Training Data Boosts LLM Performance in Math and Code, International Conference on Learning Representations (ICLR), Apr. 2026.
7. Kazuki Fujii, Rio Yokota, Swallow LLM: Continual Pre-Training and RL for Sovereign AI, GPU Technology Conference (GTC), Mar. 2026.
8. Kazuki Fujii, Yukito Tajima, Masaki Kawamura, Sakae Mizuki, Taishi Nakamura, Hinari Shimada, Masanari Ohi, Taihei Shiotani, Koshiro Saito, Takumi Okamoto, Shigeki Ishida, Youmi Ma, Hiroya Takamura, Rio Yokota, Naoaki Okazaki, Qwen3-Swallow: Continual Pre-Training of Japanese–English Thinking LLMs with Megatron-LM, GPU Technology Conference, Mar. 2026.
9. Hiro Ishii, Kenta Niwa, Hiroshi Sawada, Akinori Fujino, Noboru Harada, Rio Yokota, FedPM: Federated Learning Using Preconditioned Mixing of Local Parameters, The 40th Annual AAAI Conference on Artificial Intelligence, Jan. 2026.

10. Akihiro Ida, Kazuya Goto, Rio Yokota, Tasuku Hiraishi, Toshihiro Hanawa, Takeshi Iwashita, Masatoshi Kawai, Satoshi Ohshima, Tetsuya Hoshino, Tensor-Core-Optimized Strategies for BLR × Tall-Skinny Matrix Multiplication in BEM, SCA/HPCAsia, Jan. 2026.
11. Yukito Tajima, Nakamasa Inoue, Yusuke Sekikawa, Ikuro Sato, Rio Yokota, Masked Gated Linear Unit, Annual Conference on Neural Information Processing Systems (NeurIPS), Dec. 2025.
12. Avrajit Ghosh, Bai Cong, Rio Yokota, Saiprasad Ravishankar, Rongrong Wang, Molei Tao, Mohammad Emtiyaz Khan, Thomas Möllenhoff, Variational Learning Finds Flatter Solutions at the Edge of Stability, Annual Conference on Neural Information Processing Systems (NeurIPS), Dec. 2025.
13. Satoshi Ohshima, Akihiro Ida, Masatoshi Kawai, Takeshi Fukaya, Rio Yokota, A Study on the Performance and Usability of Managed Memory and Unified Memory for Accelerating Numerical Calculation Program, 18th IEEE International Symposium on Embedded Multicore/Manycore Systems-on-Chip (MCSoC), Dec. 2025.
14. Kazuma Kobayashi, Zhen Wan, Fei Cheng, Yuma Tsuta, Xin Zhao, Junfeng Jiang, Jiahao Huang, Zhiyi Huang, Yusuke Oda, Rio Yokota, Yuki Arase, Daisuke Kawahara, Akiko Aizawa, Sadao Kurohashi, Leveraging High-Resource English Corpora for Cross-lingual Domain Adaptation in Low-Resource Japanese Medicine via Continued Pre-training, EMNLP Findings, Nov. 2025.
15. Youmi Ma, Sakae Mizuki, Kazuki Fujii, Taishi Nakamura, Masanari Ohi, Hinari Shimada, Taihei Shiotani, Koshiro Saito, Koki Maeda, Kakeru Hattori, Takumi Okamoto, Shigeki Ishida, Rio Yokota, Hiroya Takamura, Naoaki Okazaki, Building Instruction-Tuning Datasets from Human-Written Instructions with Open-Weight Large Language Models, Conference on Language Modeling (COLM), Oct. 2025.
16. Koshiro Saito, Sakae Mizuki, Masanari Ohi, Taishi Nakamura, Taihei Shiotani, Koki Maeda, Youmi Ma, Kakeru Hattori, Kazuki Fujii, Takumi Okamoto, Shigeki Ishida, Hiroya Takamura, Rio Yokota, Naoaki Okazaki, Why We Build Local Large Language Models: An Observational Analysis from 35 Japanese and Multilingual LLMs, COLM 2025 Workshop on Multilingual and Equitable Language Technologies (MELT), Oct. 2025.
17. Satoki Ishikawa, Tal Ben-Nun, Brian Van Essen, Rio Yokota, Nikoli Dryden, Lion Cub: Minimizing Communication Overhead in Distributed Lion, ICML 2025 Workshop TTODLer-FM, July 2025.
18. Taishi Nakamura, Satoki Ishikawa, Masaki Kawamura, Takumi Okamoto, Daisuke Nohara, Jun Suzuki, Rio Yokota, Optimal Sparsity of Mixture-of-Experts Language Models for Reasoning Tasks, ICML 2025 2nd AI for Math Workshop, July 2025.
19. Chen Zhuang, Lingqi Zhang, Du Wu, Peng Chen, Jiajun Huang, Xin Liu, Rio Yokota, Nikoli Dryden, Toshio Endo, Satoshi Matsuoka, Mohamed Wahib, Scaling Large-scale GNN Training to Thousands of Processors on CPU-based Supercomputers, 39th ACM International Conference on Supercomputing (ICS), June 2025.
20. Thomas Spendlhofer, Qianxiang Ma, Yasuhiro Matsumoto, Rio Yokota, On the Interplay Between Precision, Rank, Admissibility, and Iterative Refinement for Hierarchical Low-Rank Matrix Solvers, ISC High Performance, June 2025.
21. Qi Sun, Edoardo Cetin, Yujin Tang, Transformer^2 Self-adaptive LLMs, The 13th International Conference on Learning Representations (ICLR), Apr. 2025.
22. Edoardo Cetin, Qi Sun, Tianyu Zhao, Yujin Tang, An Evolved Universal Transformer Memory, The 13th International Conference on Learning Representations (ICLR), Apr. 2025.
23. Satoki Ishikawa, Ryo Karakida, Rio Yokota, Local Loss Optimization in the Infinite Width: Stable Parameterization of Predictive Coding Networks and Target Propagation, The 13th International Conference on Learning Representations (ICLR), Apr. 2025.

24. Satoki Ishikawa, Makoto Yamada, Han Bao, Yuki Takezawa. PhiNets: Brain-inspired Non-contrastive Learning Based on Temporal Prediction Hypothesis, The 13th International Conference on Learning Representations (ICLR), Apr. 2025.
25. Taishi Nakamura, Takuya Akiba, Kazuki Fujii, Yusuke Oda, Rio Yokota, Jun Suzuki, Drop Upcycling: Training Sparse Mixture of Experts with Partial Re-initialization, The 13th International Conference on Learning Representations (ICLR), Apr. 2025.
26. So Kuroki, Taishi Nakamura, Takuya Akiba, Yujin Tang. Agent Skill Acquisition for Large Language Models via CycleQD, The 13th International Conference on Learning Representations (ICLR), Apr. 2025.
27. Qi Sun, Marc Pickett, Aakash Kumar Nain, Llion Jones, Transformer Layers as Painters, The 39th Annual AAAI Conference on Artificial Intelligence (AAAI), Feb. 2025.
28. Chen Zhuang, Peng Chen, Xin Liu, Nikoli Dryden, Rio Yokota, Toshio Endo, Satoshi Matsuoka, Mohamed Wahib, SuperGCN: General and Scalable Framework for GCN Training on CPU-powered Supercomputers, PPoPP, poster, Mar. 2025.
29. Shun Iwase, Shuya Takahashi, Nakamasa Inoue, Rio Yokota, Ryo Nakamura, Hirokatsu Kataoka, Eisaku Maeda, On the Relationship Between Double Descent of CNNs and Shape/Texture Bias Under Learning Process, 27th International Conference on Pattern Recognition (ICPR), Dec. 2024.
30. Bai Cong, Nico Daheim, Yuesong Shen, Daniel Cremers, Rio Yokota, Mohammad Emtiyaz Khan, Thomas Möllenhoff, Variational Low-Rank Adaptation Using IVON, NeurIPS 2024 Workshop on Fine-Tuning in Modern Machine Learning (FITML), Dec. 2024.
31. Kazuki Fujii, Taishi Nakamura, Rio Yokota, llm-recipies, A Framework for Seamless Integration and Efficient Continual Pre-Training of Large Language Models, SC'24 TPC Workshop, Nov. 2024.
32. Taishi Nakamura, Mayank Mishra, Simone Tedeschi, Yekun Chai, Jason T Stillerman, Felix Friedrich, Prateek Yadav, Tanmay Laud, Vu Minh Chien, Terry Yue Zhuo, Diganta Misra, Ben Bogin, Xuan-Son Vu, Marzena Karpinska, Arnav Varma Dantuluri, Wojciech Kusa, Tommaso Furlanello, Rio Yokota, Niklas Muennighoff, Suhas Pai, Tosin Adewumi, Veronika Laippala, Xiaozhe Yao, Adalberto Junior, Alpay Ariyak, Aleksandr Drozd, Jordan Clive, Kshitij Gupta, Liangyu Chen, Qi Sun, Ken Tsui, Noah Persaud, Nour Fahmy, Tianlong Chen, Mohit Bansal, Nicolo Monti, Tai Dang, Ziyang Luo, Tien-Tung Bui, Roberto Navigli, Virendra Mehta, Matthew Blumberg, Victor May, Huu Nguyen, Sampo Pyysalo, Aurora-M: The First Open Source Multilingual Language Model Red-teamed according to the U.S. Executive Order, The 31st International Conference on Computational Linguistics (COLING), Industry Track, Jan. 2025.
33. Naoaki Okazaki, Kakeru Hattori, Shota Hirai, Hiroki Iida, Masanari Ohi, Kazuki Fujii, Taishi Nakamura, Mengsay Loem, Rio Yokota, Sakae Mizuki, Building a Large Japanese Web Corpus for Large Language Models, Conference on Language Modeling COLM, Oct. 2024.
34. Kazuki Fujii, Taishi Nakamura, Mengsay Loem, Hiroki Iida, Masanari Ohi, Kakeru Hattori, Hirai Shota, Sakae Mizuki, Rio Yokota, Naoaki Okazaki, Continual Pre-Training for Cross-Lingual LLM Adaptation: Enhancing Japanese Language Capabilities, Conference on Language Modeling COLM, Oct. 2024.
35. Go Otani, Ryu Tadokoro, Ryosuke Yamada, Yuki Asano, Iro Laina, Christian Rupprecht, Nakamasa Inoue, Rio Yokota, Hirokatsu Kataoka, Yoshimitsu Aoki, Rethinking Image Super-Resolution from Training Data Perspectives, European Conference on Computer Vision (ECCV), Sep. 2024.
36. Ryo Nakamura, Ryu Tadokoro, Ryosuke Yamada, Yuki Asano, Iro Laina, Christian Rupprecht, Nakamasa Inoue, Rio Yokota, Hirokatsu Kataoka, Scaling Backwards: Minimal Synthetic Pre-training?, European Conference on Computer Vision (ECCV), Sep. 2024.

37. Ryosuke Yamada, Kensho Hara, Hirokatsu Kataoka, Koshi Makihara, Nakamasa Inoue, Rio Yokota, Yutaka Satoh, Formula-Driven Visual-Geometric Pre-training, European Conference on Computer Vision (ECCV), Sep. 2024.
38. Ryo Hayamizu, Shota Nakamura, Sora Takashima, Hirokatsu Kataoka, Ikuro Sato, Nakamasa Inoue, Rio Yokota, SIFTer: Self-improving Synthetic Datasets for Pre-training Classification Models, CVPR SynData Workshop, Jun. 2024.
39. Yuesong Shen, Nico Daheim, Gian Maria Marconi, Peter Nickl, Bai Cong, Bazan Clement Emile Marcel Raoul, Rio Yokota, Iryna Gurevych, Daniel Cremers, Mohammad Emtiyaz Khan, Thomas Möllenhoff, Variational Learning is Effective for Large Deep Networks, The 41st International Conference on Machine Learning (ICML), Jul. 2024.
40. Hiromichi Kobayashi, Satoshi Yui, Makoto Tsubota, Tomokazu Saito, Rio Yokota, Interaction between quantum turbulence and normal-fluid turbulence in superfluid helium, Thirteenth International Symposium on Turbulence and Shear Flow Phenomena (TSFP13), Jun. 2024.
41. Satoki Ishikawa, Ryo Karakida, On the Parameterization of Second-Order Optimization Effective towards the Infinite Width, The 12th International Conference on Learning Representations (ICLR), May. 2024.
42. Satoki Ishikawa, Rio Yokota, When Does Second-Order Optimization Speed Up Training? The 12th International Conference on Learning Representations (ICLR), Tiny paper, May. 2024.
43. Ryo Nakamura, Sora Takashima, Edgar Josafat Martinez-Noriega, Nakamasa Inoue, Hirokatsu Kataoka, Rio Yokota, Pre-training Vision Transformers with Very Limited Synthesized Images, IEEE/CVF International Conference on Computer Vision (ICCV), Oct. 2023.
44. Risa Shinoda, Ryo Hayamizu, Kodai Nakashima, Nakamasa Inoue, Rio Yokota, Hirokatsu Kataoka, SegRCDB: Semantic Segmentation via Formula-Driven Supervised Learning, IEEE/CVF International Conference on Computer Vision (ICCV), Oct. 2023.
45. Muhammad Ridwan Apriansyah, Rio Yokota, Computing Eigenvalue of Symmetric $\mathcal{H}^2$-Matrices in Linear Time with Slicing the Spectrum, International Conference on Parallel Processing (ICPP), Aug. 2023.
46. Sameer Deshmukh, Rio Yokota, George Bosilca, O(N) Distributed Direct Factorization of Structured Dense Matrices Using Runtime Systems, International Conference on Parallel Processing (ICPP), Aug. 2023.
47. Hiroyuki Ootomo, Rio Yokota, Mixed-Precision Random Projection for RandNLA on Tensor Cores, Platform for Advanced Scientific Computing (PASC), Jun. 2023.
48. Sora Takashima, Ryoh Hayamizu, Nakamasa Inoue, Hirokatsu Kataoka, Rio Yokota, Visual Atoms: Pre-training Vision Transformers with Sinusoidal Waves, IEEE/CVF Conference on Computer Vision and Pattern Recognition, Jun. 2023.
49. Hiroyuki Ootomo, Hidetaka Manabe, Kenji Harada, Rio Yokota, Quantum Circuit Simulation by SGEMM Emulation on Tensor Cores and Automatic Precision Selection, ISC High Performance, May 2023.
50. Hiroyuki Ootomo, Rio Yokota, Reducing Shared Memory Footprint to Leverage High Throughput on Tensor Cores and its Flexible API Extension Library, HPC Asia, Feb. 2023.
51. Satoshi Ohshima, Akihiro Ida, Rio Yokota and Ichitaro Yamazaki, QR Factorization of Block Low-Rank Matrices on Multi-Instance GPU, The 23rd International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT'22), Dec. 2022.
52. Hiroki Naganuma, Kartik Ahuja, Ioannis Mitliagkas, Shiro Takagi, Tetsuya Motokawa, Rio Yokota, Kohta Ishikawa, Ikuro Sato, Empirical Study on Optimizer Selection for Out-of-Distribution Generalization, NeurIPS Workshop Distshift, Dec. 2022.
53. Kazuki Osawa, Satoki Ishikawa, Rio Yokota, Shigang Li, Torsten Hoefler, ASDL: A Unified Interface for Gradient Preconditioning in PyTorch, NeurIPS Workshop Order up! The Benefits of Higher-Order Optimization in Machine Learning, Dec. 2022.

54. Aoyu Li, Ikuro Sato, Kohta Ishikawa, Rei Kawakami, Rio Yokota, Informative Sample-Aware Proxy for Deep Metric Learning, ACM Multimedia Asia, Dec. 2022. (Best paper)
55. Qianxiang Ma, Sameer Deshmukh, Rio Yokota, Scalable Linear Time Dense Direct Solver for 3-D Problems Without Trailing Sub-Matrix Dependencies, The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC22), Nov. 2022.
56. Hirokatsu Kataoka, Ryo Hayamizu, Ryosuke Yamada, Kodai Nakashima, Sora Takashima, Xinyu Zhang, Edgar Josafat Martinez-Noriega, Nakamasa Inoue, Rio Yokota, Replacing Labeled Real-image Datasets with Auto-generated Contours, IEEE/CVF Conference on Computer Vision and Pattern Recognition, Jun. 2022.
57. Hana Hoshino, Kei Ota, Asako Kanezaki, Rio Yokota, OPIRL: Sample Efficient Off-Policy Inverse Reinforcement Learning via Distribution Matching, IEEE International Conference on Robotics and Automation, May 2022.
58. Shun Iwase, Xingyu Liu, Rawal Khirodkar, Rio Yokota, Kris M. Kitani, RePOSE: Real-Time Iterative Rendering and Refinement for 6D Object Pose Estimation, International Conference on Computer Vision, Oct. 2021.
59. Hikaru Nakata, Nakamasa Inoue, Rio Yokota, Self-supervised Continual Pretraining for Class Incremental Image Classification, Proc. CVPR CLVISION Workshop (Findings), Jun. 2021.
60. Ryo Karakida, Kazuki Osawa, Understanding Approximate Fisher Information for Fast Convergence of Natural Gradient Descent in Wide Neural Networks, Advances in Neural Information Processing Systems (NeurIPS), oral presentation, Dec. 2020.
61. Yuichiro Ueno, Kazuki Osawa, Yohei Tsuji, Akira Naruse, Rio Yokota. Rich Information is Affordable: A Systematic Performance Analysis of Second-order Optimization Using K-FAC. Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining. Aug. 2020.
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2. Supercomputing Asia (SCAsia 2027), invited speaker chair
3. IEEE International Parallel and Distributed Processing Symposium (IPDPS 2027), reviewer
4. Supercomputing Asia / International Conference on High Performance Computing in Asia-Pacific Region (SCA/HPCAsia 2026), vice-general chair, TPC, ADAC committee, AI4S committee
5. ISC High Performance (ISC 2026), deputy program chair
6. The AAAI Conference on Artificial Intelligence (AAAI 2026), reviewer
7. ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2026), program committee
8. International Conference on Learning Representations (ICLR 2026), reviewer
9. The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR 2026), reviewer
10. SIAM Conference on Parallel Processing for Scientific Computing (SIAM PP 2026), program committee
11. Platform for Advanced Scientific Computing (PASC 2026), domain co-chair
12. International Conference on Machine Learning (ICML 2026), reviewer
13. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2026), ML track chair, Dissertation Award, Trey panel, UQ panel
14. Conference on Neural Information Processing Systems (NeurIPS 2026), area chair
15. Annual Meeting of the Association for Computational Linguistics (ACL 2026), reviewer
16. International Conference on Parallel Architectures and Compilation Techniques (PACT 2025), publicity chair
17. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2025), proceedings vice-chair, program committee, AI4S committee
18. Conference on Neural Information Processing Systems (NeurIPS 2025), reviewer
19. IEEE International Conference on Cluster Computing (IEEE CLUSTER 2025), track co-chair
20. International Conference on Machine Learning (ICML 2025), reviewer
21. ISC High Performance (ISC 2025), program committee
22. Platform for Advanced Scientific Computing (PASC 2025), domain co-chair

23. 39th IEEE International Parallel and Distributed Processing Symposium, (IPDPS 2025), program committee, best OSS judge
24. The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR 2024), reviewer
25. 38th Conference on Neural Information Processing Systems (NeurIPS 2024), reviewer
26. The 12th International Conference on Learning Representations (ICLR 2024), reviewer
27. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2024), poster, ML track, AI4S/TPC WS, LLMs for HPC BoF
28. International Conference on Preconditioning Techniques for Scientific and Industrial Applications, (Precond 2024), program committee
29. 38th IEEE International Parallel and Distributed Processing Symposium, (IPDPS 2024), track co-chair
30. ISC High Performance (ISC 2024), posters chair
31. The 30th International Conference on Parallel Processing (Euro-Par 2024), program committee
32. ACM International Symposium on High-Performance, Parallel and Distributed Computing (HPDC 2024), program committee
33. SC Asia (SCA 2024), program committee
34. Platform for Advanced Scientific Computing (PASC 2024), program committee
35. SIAM Conference on Linear Algebra (LA24), scientific committee
36. SIAM Conference on Computational Science and Engineering (CSE23), poster judge
37. 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023), program committee
38. IEEE International Conference on Cluster Computing (IEEE CLUSTER 2023), publicity chair
39. Principles and Practice of Parallel Programming (PPoPP 2023), publicity chair
40. 37th IEEE International Parallel and Distributed Processing Symposium, (IPDPS 2023), program committee
41. ISC High Performance (ISC 2023), posters deputy chair
42. Platform for Advanced Scientific Computing (PASC 2023), mini symposia and posters committee, program committee
43. The 23rd IEEE/ACM international Symposium on Cluster, Cloud and Internet Computing (CCGrid 2023), program committee
44. The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR 2023), reviewer
45. The 32nd International Conference on Parallel Architectures and Compilation Techniques (PACT 2023), publicity chair Asia
46. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2023), posters, workshops, ML tech paper, panelist, best paper
47. 37th Conference on Neural Information Processing Systems (NeurIPS 2023), reviewer
48. The Eleventh International Conference on Learning Representations (ICLR 2023), reviewer
49. European Conference on Computer Vision (ECCV 2022), reviewer
50. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2022), program committee, workshop chair
51. 49th International Conference on Parallel Processing (ICPP 2022), program committee
52. IEEE Cluster (IEEE Cluster 2022), program committee

53. ISC High Performance (ISC 2022), poster committee
54. The 36th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2022), program committee
55. International Conference on High Performance Computing ini Asia-Pacific Region (HPC Asia 2022), Applications track co-chair
56. IEEE International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD), program committee
57. 48th International Conference on Parallel Processing (ICPP 2021), program committee
58. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2021), program committee
59. IEEE Cluster (IEEE Cluster 2021), program committee
60. ISC High Performance (ISC 2021), program committee, best paper committee, steering committee
61. The 35th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2021), program committee
62. International Conference on High Performance Computing ini Asia-Pacific Region (HPC Asia 2021), organizing committee
63. SIAM Computational Science and Engineering (SIAM CSE 2021), organizing committee
64. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2020), ML track Chair
65. The 26th International Conference on Parallel Processing (Euro-Par 2020), program committee
66. SIAM Conference on Parallel Processing for Scientific Computing (SIAM PP 2020), program committee
67. International Conference on High Performance Computing ini Asia-Pacific Region (HPC Asia 2020), program committee
68. The 3rd cross-disciplinary Workshop on Computing Systems, Infrastructures, and Programming (xSIG 2019), program committee
69. IEEE 13th International Symposium on Embedded Multicore/Many-core Systems-on-Chip (MCSoC 2019), ATMG Track Chair
70. 48th International Conference on Parallel Processing (ICPP 2019), Applications track chair, Workshop co-organizer
71. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2019), program committee
72. ISC High Performance (ISC 2019), program committee
73. IEEE Cluster (IEEE Cluster 2019), program committee
74. Platform for Advanced Scientific Computing Conference (PASC 2019), program committee
75. SIAM Conference on Computational Science and Engineering (SIAM CSE19), organizing committee
76. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2018), proceedings chair
77. ISC High Performance (ISC 2018), proceedings chair
78. IEEE Cluster (IEEE Cluster 2018), program committee
79. The 32nd IEEE International Parallel & Distributed Processing Symposium (IPDPS 2018), program committee

80. 18th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid 2018), program committee
81. SC Asia (SCA 2018), program committee
82. SIAM Conference on Parallel Processing for Scientific Computing (SIAM PP 2018), organizing committee
83. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2017), program committee
84. Platform for Advanced Scientific Computing Conference (PASC 2017), program committee
85. The 31st IEEE International Parallel & Distributed Processing Symposium (IPDPS 2017), program committee
86. International Conference on Supercomputing (ICS 2017), program committee
87. IEEE Cluster (IEEE Cluster 2017), program committee
88. The 23rd International Conference on Parallel Processing (Euro-Par 2017), program committee
89. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2016), program committee
90. Platform for Advanced Scientific Computing Conference (PASC 2016), program committee
91. ISC High Performance (ISC 2016), program committee
92. The 30th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2016), program committee
93. The 23rd annual IEEE International Conference on High Performance Computing, Data, and Analytics (HiPC 2016), program committee
94. 16th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid 2016), program committee
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103. The International Conference for High Performance Computing, Networking, Storage and Analysis (SC 2014), program committee
104. The International Meeting on High-Performance Computing for Computational Science (VECPAR 2014), program committee
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108. The 28th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2013), program committee
109. 18th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2013), program committee
110. The annual IEEE International Conference on High Performance Computing (HiPC 2013), program committee
111. 15th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC 2013), program committee
112. The 12th International Symposium on Parallel and Distributed Computing (ISPDC 2012), program committee
113. The Third International Workshop on Frontier of GPU Computing (FCG 2012), program committee

Research Grants

1. 2026–2030. Realization of a next-generation high-performance linear solver to pioneer the future of computational science and engineering (Grant-in-Aid for Scientific Research (A), JSPS)
2. 2026–2029. High-performance urban model computing (Grant-in-Aid for Scientific Research (B), JSPS)
3. 2025–2030. Creation of GPU educational materials and implementation of educational programs, and promotion of advanced utilization of GPU computing resources centered on generative AI technologies (MEXT Next-Generation HPC and AI Development Support Hub Program, MEXT)
4. 2025–2028. Modernization of scientific and technical software to unlock the potential of next-generation computers (Grant-in-Aid for Scientific Research (A), JSPS)
5. 2024–2030. Red-teaming platform for large language model misalignment (JST K Program, JST)
6. 2024–2029. Research on distributed parallel pre-training of large language models (JST Program for Forming Research and Development Centers for Next-Generation AI Technologies, JST)
7. 2024–2028. Building AI foundation models under limited resources through continual pre-training using synthetic data and small amounts of real data (Fund for the Promotion of Joint International Research (Fostering Joint International Research), JSPS)
8. 2024–2027. Expanding the applicability of low-rank structured matrix methods and leveraging diverse computing architectures (Grant-in-Aid for Scientific Research (B), JSPS)
9. 2024–2027. Research toward establishing an outcome-extraction methodology for evaluating the efficacy and safety of pharmaceuticals using Large Language Models (LLM) (Health, Labour and Welfare Sciences Research Grant, Applied Research, MHLW)
10. 2023–2026. Compositional pattern recognition and understanding using deep generative models (Grant-in-Aid for Scientific Research (A), JSPS)
11. 2022–2026. Functional improvement of mixing promotion in fluid equipment by elucidating the universal statistical law of two-phase turbulence (Grant-in-Aid for Scientific Research (B), JSPS)
12. 2022–2025. Fast and accurate eigenvalue calculations by hierarchical low-rank approximation and its application to large-scale electronic structure calculations (Grant-in-Aid for Scientific Research (B), JSPS)
13. 2021–2027. Adaptive, robust, and continual artificial intelligence systems based on the Bayes duality principle (CREST, JST)

14. 2021–2024. Construction of numerical linear algebra based on lattice H-matrices and its high-performance implementation on modern architectures (Grant-in-Aid for Scientific Research (B), JSPS)
15. 2020–2023. Application of unconventional linear algebra techniques to continual learning in supergiant neural networks (Grant-in-Aid for Challenging Research (Pioneering), JSPS)
16. 2020–2023. Life-Long Deep Learning using Bayesian Principles (Grant-in-Aid for Scientific Research (B), JSPS)
17. 2018–2021. Linear solvers for machine learning hardware (Grant-in-Aid for Scientific Research (B), JSPS)
18. 2017–2020. Enhancement of an H-matrix library and optimization for next-generation supercomputers (Grant-in-Aid for Scientific Research (B), JSPS)
19. 2016–2022. Acceleration and economization of deep learning algorithms for image processing in social infrastructure (CREST, JST)
20. 2016–2019. Hierarchical particle-method framework for exascale computers balancing performance and productivity (Grant-in-Aid for Scientific Research (B), JSPS)
21. 2016–2018. Large-scale iterative solvers combining the FMM and H-matrices (Grant-in-Aid for Young Scientists (A), JSPS)
22. 2015–2016. Algebraic extension of the FMM as a preconditioner for exascalable large-scale linear systems (Grant-in-Aid for Research Activity Start-up, JSPS)