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Education

Bachelor of Engineering, March 2005, Faculty of Engineering, Kyoto University

Master of Engineering, March 2007, Graduate School of Engineering, Kyoto University

Doctor of Engineering, March 2010, Graduate School of Engineering, Kyoto University

Thesis Title: Combinatorial Rigidity and Generation of Discrete Structures
Advisor: Prof. Naoki Katoh

Academic and Professional Experiences

4/2007 - 3/2010 Research Fellow of Japan Society for the Promotion of Science (JSPS)

9/2007 - 1/2008 Visiting Researcher (worked with Prof. David Avis), School of Computer Science, McGill University

4/2010 - 5/2011 Postdoctoral Fellow of Japan Society for the Promotion of Science (JSPS)

6/2011 - 3/2017 Assistant Professor, Kyoto University, RIMS

4/2015 - 3/2017 JSPS Postdoctoral Fellows for Research Abroad

4/2015 - 3/2017 Visiting Researcher, Networks and Optimization group, CWI

4/2017 - Associated Professor, University of Tokyo,

Professional Activities

FAW2011 (The Fifth International Frontiers of Algorithmics Workshop) Program Committees

SoCG2014 (The 30th Annual Symposium on Computational Geometry) Program Committees, Organizing Committees

JCDCGG (The 18th Japan Conference on Discrete and Computational Geometry and Graphs) Organizing Committees

ISCO2016 (The 4th International Symposium on Combinatorial Optimization) Program Committees

JCCA2016 (The Japanese Conference on Combinatorics and its Applications) Organizing Committees

ISAAC2016 (The 27th International Symposium on Algorithms and Computation) Program Committees

ISAAC2018 (The 29th International Symposium on Algorithms and Computation) Program Committees

TAMC 2020 (The 16th Annual Conference on Theory and Applications of Models of Computation) Program Committees

List of Publications

Preprints

1. Ryoshun Oba and Shin-ichi Tanigawa, Realizable dimension of periodic frameworks, arXiv:2306.02743
2. James Cruickshank, Fatemeh Mohammadi, Anthony Nixon, and Shin-ichi Tanigawa, Identifiability of points and rigidity of hypergraphs under algebraic constraints, arXiv:2305.18990
3. James Cruickshank, Bill Jackson, and Shin-ichi Tanigawa, Rigidity of symmetric simplicial complexes and the lower bound theorem, arXiv:2304.04693, 2023.
4. Ryoshun Oba and Shin-ichi Tanigawa, Super stable tensegrities and Colin de Verdière number ν , arXiv:2212.04556, 2022.
5. James Cruickshank, Bill Jackson, Shin-ichi Tanigawa, Global rigidity of triangulated manifolds, arXiv:2204.02503, 2022.
6. Shin-ichi Tanigawa: The signed positive semidefinite matrix completion problem for odd- K_4 minor free signed graphs, arXiv:1603.08370, 2016.

Refereed Publications

1. Bill Jackson and Shin-ichi Tanigawa: Maximal matroids in weak order posets, to appear in *Journal of Combinatorial Theory, Series B*, arXiv:2102.09901
2. James Cruickshank, Fatemeh Mohammadi, Harshit Motwani, Anthony Nixon, and Shin-ichi Tanigawa, Global rigidity of line constrained frameworks, to appear in *SIAM Journal on Discrete Mathematics*, arXiv:2208.09308
3. Kazusato Oko, Shinsaku Sakaue, Shin-ichi Tanigawa, Nearly tight spectral sparsification of directed hypergraphs by a simple iterative sampling algorithm, *Proceedings of the 50th International Colloquium on Automata, Languages, and Programming (ICALP 2023)*, arxiv.org/abs/2204.02537, 2023.
4. Satoru Fujishige, Tamás Kiraly, Kazuhisa Makino, Kenjiro Takazawa, and Shin-ichi Tanigawa: Minimizing submodular functions on diamonds via generalized fractional matroid matchings, *Journal of Combinatorial Theory, Series B*, 157, 294–345, 2022. doi.org/10.1016/j.jctb.2022.07.005
5. Tibor Jordán and Shin-ichi Tanigawa: Rigidity of random subgraphs and eigenvalues of stiffness matrices, *SIAM Journal on Discrete Mathematics*, 36, 2367–2392, 2022. doi.org/10.1137/20M1349849

6. James Cruickshank, Bill Jackson, Shin-ichi Tanigawa, Vertex splitting, coincident realisations and global rigidity of braced triangulations, *Discrete & Computational Geometry*, 69, 192–208, 2023. doi.org/10.1007/s00454-022-00459-9
7. Tibor Jordán and Shin-ichi Tanigawa: Globally rigid powers of graphs, *Journal of Combinatorial Theory, Series B*, 155, 111–140, 2022. doi.org/10.1016/j.jctb.2022.02.004
8. Ryoshun Oba and Shin-ichi Tanigawa: Characterizing the universal rigidity of generic tensegrities, *Mathematical Programming*, 2021. doi.org/10.1007/s10107-021-01730-2
9. Katie Clinch, Bill Jackson, and Shin-ichi Tanigawa: Abstract 3-rigidity and bivariate C_2^1 -splines II: combinatorial characterization, *Discrete Analysis*, 2022:3, 2022. doi.org/10.19086/da.34692
10. Katie Clinch, Bill Jackson, and Shin-ichi Tanigawa: Abstract 3-rigidity and bivariate C_2^1 -splines I: Whiteley’s maximality conjecture, *Discrete Analysis*, 2022:2, 2022. doi.org/10.19086/da.34691
11. Bill Jackson, Anthony Nixon, and Shin-ichi Tanigawa: An improved bound for the rigidity of linearly constrained frameworks, *SIAM Journal on Discrete Mathematics*, 35(2):928–933, 2021. doi:10.1137/20M134304X
12. Viktória E. Kaszanitzkya, Bernd Schulzea, and Shin-ichi Tanigawa: Global rigidity of periodic graphs under fixed lattice representations, *Journal of Combinatorial Theory, Series B*, 146, 176–218, 2021. doi.org/10.1016/j.jctb.2020.09.009
13. Quentin. Fortier, Csaba Király, Zoltán Szigeti, and Shin-ichi Tanigawa: On packing spanning arborescences with matroid constraint, *Journal of Graph Theory*, 93, 230–252, 2020. doi:10.1002/jgt.22484
14. Csaba Király, Zoltán Szigeti, and Shin-ichi Tanigawa: Packing of arborescences with matroid constraints via matroid intersection, *Mathematical Programming*, 181, 85–117, 2020. doi:10.1007/s10107-019-01377-0
15. Monique Laurent and Shin-ichi Tanigawa: Perfect elimination orderings of symmetric matrices, *Optimization Letters*, 14, 339–353, 2020, doi.org/10.1007/s11590-017-1213-y.
16. Tibor Jordán and Shin-ichi Tanigawa: Global rigidity of triangulations with braces, *Journal of Combinatorial Theory, Series B*, 136, 249–288, 2019, doi:10.1016/j.jctb.2018.11.003
17. Tatsuya Matsuoka and Shin-ichi Tanigawa: On reachability mixed arborescence packing, *Discrete Optimization*, 32, 1–10, 2019 doi:10.1016/j.disopt.2018.10.002
18. Motoki Ikeda and Shin-ichi Tanigawa: Cut sparsifiers for balanced digraphs, *Proceedings of the 16th International Workshop on Approximation and Online Algorithms (WAOA2018)*, LNCS 11312, 277–294, 2018. doi:10.1007/978-3-030-04693-4_17
19. Anthony Nixon, Bernd Schulze, Shin-ichi Tanigawa, and Walter Whiteley: Rigidity of frameworks on expanding sphere, *SIAM Journal on Discrete Mathematics*, 32, 25912–2611, 2018, doi:10.1137/17M1116088
20. Yaser Eftekhari, Bill Jackson, Anthony Nixon, Bernd Schulze, Shin-ichi Tanigawa, Walter Whiteley: Point-hyperplane frameworks, slider joints, and rigidity preserving transformations, *Journal of Combinatorial Theory, Series B*, 135, 44–74, 2018, doi:10.1016/j.jctb.2018.07.008
21. Satoru Fujishige and Shin-ichi Tanigawa: Polynomial combinatorial algorithms for skew-bisubmodular function minimization, *Mathematical Programming*, 171, 87–114, 2018, doi:10.1007/s10107-017-1171-2.
22. Rintaro Ikeshita and Shin-ichi Tanigawa: Count matroids of group-labeled graphs, *Combinatorica*, 38, 1101–1127, 2018. doi:10.1007/s00493-016-3469-8

23. Monique Laurent, Matteo Seminaroti, and Shin-ichi Tanigawa: A structural characterization for certifying Robinsonian matrices, *The Electronic Journal of Combinatorics*, 24, P2.21, 2017.
24. Shin-ichi Tanigawa: Singularity degree of the positive semidefinite matrix completion problem, *SIAM Journal on Optimization*, 27, 986–1009, 2017. doi.org/10.1137/16M1069262
25. Bill Jackson, Tibor Jordán and Shin-ichi Tanigawa: Unique low rank completability of partially filled matrices, *Journal of Combinatorial Theory, Series B*, 121, 432-462, 2016. doi.org/10.1016/j.jctb.2016.07.013
26. Yutaro Yamaguchi and Shin-ichi Tanigawa: Packing non-zero A-paths via matroid matching, *Discrete Applied Mathematics*, 214, 169–178, 2016. doi.org/10.1016/j.dam.2016.06.001
27. Tibor Jordán, Viktória Kaszanitzky, and Shin-ichi Tanigawa: Gain-sparsity and symmetry-forced rigidity in the plane. *Discrete & Computational Geometry*, 55, 314-372, 2016. doi: 10.1007/s00454-015-9755-1.
28. Tibor Jordán, Csaba Király, and Shin-ichi Tanigawa: Generic global rigidity of body-hinge frameworks, *Journal of Combinatorial Theory, Series B*, 117, 59-76, 2016. doi:10.1016/j.jctb.2015.11.003
29. Satoru Iwata, Shin-ichi Tanigawa, and Yuichi Yoshida: Improved approximation algorithms for k -submodular function maximization, *Proc. ACM-SIAM Symposium on Discrete Algorithms (SODA16)*, 404-413, 2016.
30. Sergey Bereg, Seok-Hee Hong, Naoki Katoh, Sheung-Hung Poon, and Shin-ichi Tanigawa: On the edge crossing properties of Euclidean minimum weight Laman graphs. *Computational Geometry Theory and Applications*, 51, 15-24, 2016.
31. Bernd Schulze and Shin-ichi Tanigawa: Infinitesimal rigidity of symmetric frameworks, *SIAM Journal on Discrete Mathematics*, 29(3), 1259–1286, 2015. doi: 10.1137/130947192
32. Shin-ichi Tanigawa: Sufficient conditions for globally rigidity of graphs, *Journal of Combinatorial Theory Series B*, 113: 123–140, 2015. doi:10.1016/j.jctb.2015.01.003
33. Shin-ichi Tanigawa: Matroids of gain graphs in applied discrete geometry. *Transactions of the American Mathematical Society*, 367, 8597-8641, 2015. doi: http://dx.doi.org/10.1090/tran/6401
34. Shin-ichi Tanigawa and Yuichi Yoshida: Testing the supermodular-cut condition. *Algorithmica*, 71(4), 1065-1075, 2015. doi:10.1007/s00453-013-9842-8
35. Ciprian Borcea, Ileana Streinu, and Shin-ichi Tanigawa: Periodic body-and-bar frameworks. *SIAM Journal on Discrete Mathematics*, 29(1), 93-112, 2015. doi:10.1137/120900265
36. Bill Jackson, Tibor Jordán, and Shin-ichi Tanigawa: Combinatorial conditions for the unique completability of low rank matrices, *SIAM Journal on Discrete Mathematics*, 28(4), 1797-1819, 2014. doi:10.1137/140960098
37. Bernd Schulze and Shin-ichi Tanigawa: Linking rigid bodies symmetrically, *European Journal of Combinatorics*, 42, 145-166, 2014. doi:10.1016/j.ejc.2014.06.002
38. Satoru Fujishige and Shin-ichi Tanigawa: A min-max theorem for transversal submodular functions and its implications, *SIAM Journal on Discrete Mathematics*, 28(4), 1855-1875, 2014. doi:10.1137/130936415
39. Satoru Fujishige, Shin-ichi Tanigawa, and Yuichi Yoshida: Generalized skew bisubmodularity: A characterization and a min-max theorem. *Discrete Optimization*, 12, 1-9, 2014.
40. Yuya Higashikawa, Naoki Katoh, Stefan Langerman, and Shin-ichi Tanigawa: Online graph exploration algorithms for cycles and trees by multiple searchers. *Journal of Combinatorial Optimization*, 28(2), 480-495, 2014.

41. Naoki Katoh and Shin-ichi Tanigawa: Rooted-tree decompositions with matroid constraints and the infinitesimal rigidity of frameworks with boundaries. *SIAM Journal on Discrete Mathematics*, 27, 155-185, 2013. doi:10.1137/110846944
42. Hee-Kap Ahn, Sang Won Bae, and Shin-ichi Tanigawa: Rectilinear Covering for Imprecise Input Points. *Proc. 23rd International Symposium on Algorithms and Computation (ISAAC 2012)*, Lecture Notes in Computer Science 7676, 309-318, 2012.
43. Shuji Kijima and Shin-ichi Tanigawa: Sparsity and connectivity of medial graphs: concerning two edge-disjoint Hamiltonian paths in planar rigidity circuits. *Discrete Mathematics*, 312(16), 2466-2472, 2012.
44. Hiro Ito, Shin-ichi Tanigawa, and Yuichi Yoshida: Constant-time algorithms for sparsity matroids. *Proc. 39th International Colloquium on Automata, Languages and Programming (ICALP 2012)*, Lecture Notes in Computer Science 7391, 498-509, 2012.
45. Shin-ichi Tanigawa: Generic rigidity matroids with Dilworth truncations. *SIAM Journal on Discrete Mathematics*, 26, 1412-1439, 2012.
46. Naoki Katoh and Shin-ichi Tanigawa: A rooted-forest partition with uniform vertex demand. *Journal of Combinatorial Optimization*, 24(2), 67-98, 2012.
47. Sang Won Bae, Sunghee Choi, Chunseok Lee, and Shin-ichi Tanigawa: Exact algorithms for the bottleneck Steiner tree problem. *Algorithmica*, 61(4), 924-948, 2011.
48. Naoki Katoh and Shin-ichi Tanigawa: A proof of the Molecular conjecture. *Discrete & Computational Geometry*, 45[4], 647-700, 2011.
49. Kevin Buchin, Radoslav Fulek, Masashi Kiyomi, Yoshio Okamoto, Shin-ichi Tanigawa, and Csaba Toth: A tight lower bound for convexly independent subsets of the Minkowski sums of planar point sets. *The Electronic Journal of Combinatorics*, 17(1), 2010.
50. Naoki Katoh and Shin-ichi Tanigawa: On the infinitesimal rigidity of bar-and-slider frameworks. *Proc. 20th International Symposium on Algorithms and Computation (ISAAC09)*, Lecture Notes in Computer Science 5878, 524-533, 2009.
51. Naoki Katoh and Shin-ichi Tanigawa: Enumerating edge-constrained triangulations and edge-constrained non-crossing spanning trees. *Discrete Applied Mathematics*, 157, 3569-3585, 2009.
52. Naoki Katoh and Shin-ichi Tanigawa: Fast enumeration algorithms for non-crossing geometric graphs. *Discrete & Computational Geometry*, 42[3], 443-468, 2009.
53. Makoto Ohsaki, Naoki Katoh, Takuya Kinoshita, Shin-ichi Tanigawa, David Avis, and Ileana Streinu: Enumeration of optimal pin-jointed bistable compliant mechanism, *Structural and Multidisciplinary Optimization*, 37[6], 645-651, 2009.
54. David Avis, Naoki Katoh, Makoto Ohsaki, Ileana Streinu, and Shin-ichi Tanigawa: Enumerating constrained non-crossing minimally rigid frameworks. *Discrete & Computational Geometry*, 40[1], 31-46, 2008.
55. Yongding Zhu, Jinhui Xu, Yang Yang, Naoki Katoh, and Shin-ichi Tanigawa: Geometric spanner of objects under L_1 distance, *Proc. 14th Annual International Computing and Combinatorics Conference (COCOON2008)*, Lecture Notes in Computer Science 5092, 395-404, 2008.
56. David Avis, Naoki Katoh, Makoto Ohsaki, Ileana Streinu, and Shin-ichi Tanigawa: Enumerating non-crossing minimally rigid frameworks. *Graphs and Combinatorics*, 23, 117-134, 2007.

57. Naoki Katoh and Shin-ichi Tanigawa: Polygonal curve approximation using grid points with application to a triangular mesh generation with small number of different edge length. *Proc. 2nd Algorithmic Aspects in Information and Management (AAIM2006)*, Lecture Notes in Computer Science 4041, 161-172, 2006.
58. Naoki Katoh and Shin-ichi Tanigawa: Finding a triangular mesh with a constant number of different edge lengths. *IEICE TRANSACTIONS on Information and Systems*, E89-D (8), 2364-2371, 2006.

Other Articles

1. Bill Jackson, Tibor Jordán, and Shin-ichi Tanigawa: Global rigidity of two-dimensional frameworks, *Handbook of Geometric Constraint Systems Principles*, Chapter 21, CRC Press, 2018.
2. Csaba Király and Shin-ichi Tanigawa: Rigidity of Body-bar-hinge Frameworks, *Handbook of Geometric Constraint Systems Principles*, Chapter 20, CRC Press, 2018.
3. Shin-ichi Tanigawa: Enumeration of Non-crossing Geometric Graphs, *Encyclopedia of Algorithms*, 2014.