

# Yusuke Kobayashi

---

Research Institute for Mathematical Sciences,  
Kyoto University,  
Kyoto 606-8502, Japan.

Email: [yusuke@kurims.kyoto-u.ac.jp](mailto:yusuke@kurims.kyoto-u.ac.jp)  
Web: <http://www.kurims.kyoto-u.ac.jp/~yusuke/>

## Personal

Born on August 2, 1982.

Japanese Citizen.

## Research Interests

Graph algorithm, discrete structure, combinatorial optimization, and graph theory.

## Education

Bachelor of Engineering from Faculty of Engineering, University of Tokyo, March 2005.

Master of Information Science and Technology from Graduate School of Information Science and Technology, University of Tokyo, March 2007.

Ph.D in Information Science and Technology from Graduate School of Information Science and Technology, University of Tokyo, March 2010.

Dissertation Title: *Algorithms for Finding Disjoint Paths: Acceleration and Extension*

Adviser: Professor Kazuo Murota

## Academic Appointments

Research Fellow of the Japan Society for the Promotion of Science (DC1), April 2007–March 2010.

Assistant Professor at University of Tokyo, April 2010–March 2015.

Associate Professor at University of Tsukuba, April 2015–March 2018.

Associate Professor at Kyoto University, April 2018–present.

## Publications

### *Journal Articles*

1. Y. Kobayashi, K. Murota, and K. Tanaka: Operations on M-convex functions on jump systems, *SIAM Journal on Discrete Mathematics*, 21 (2007), pp. 107–129.
2. Y. Kobayashi and K. Murota: Induction of M-convex functions by linking systems, *Discrete Applied Mathematics*, 155 (2007), pp. 1471–1480.

3. Y. Kobayashi and K. Takazawa: Even factors, jump systems, and discrete convexity, *Journal of Combinatorial Theory, Series B*, 99 (2009), pp. 139–161.
4. Y. Kobayashi: Induced disjoint paths problem in a planar digraph, *Discrete Applied Mathematics*, 157 (2009), pp. 3231–3238.
5. S. Iwata and Y. Kobayashi: An algorithm for minimum cost arc-connectivity orientations, *Algorithmica*, 56 (2010), pp. 437–447.
6. Y. Kobayashi: A simple algorithm for finding a maximum triangle-free 2-matching in subcubic graphs, *Discrete Optimization*, 7 (2010), pp. 197–202.
7. Y. Kobayashi and C. Sommer: On shortest disjoint paths in planar graphs, *Discrete Optimization*, 7 (2010), pp. 234–245.
8. K. Kawarabayashi and Y. Kobayashi: Algorithms for finding an induced cycle in planar graphs, *Combinatorica*, 30 (2010), pp. 715–734.
9. K. Kawarabayashi and Y. Kobayashi: An improved algorithm for the half-disjoint paths problem, *SIAM Journal on Discrete Mathematics*, 25 (2011), pp. 1322–1330.
10. S. Imahori, Y. Miyamoto, H. Hashimoto, Y. Kobayashi, M. Sasaki, and M. Yagiura: The complexity of the node capacitated in-tree packing problem, *Networks*, 59 (2012), pp. 13–21.
11. K. Kawarabayashi, Y. Kobayashi, and B. Reed: The disjoint paths problem in quadratic time, *Journal of Combinatorial Theory, Series B*, 102 (2012), pp. 424–435.
12. K. Bérczi and Y. Kobayashi: An algorithm for  $(n - 3)$ -connectivity augmentation problem: jump system approach, *Journal of Combinatorial Theory, Series B*, 102 (2012), pp. 565–587.
13. K. Kawarabayashi and Y. Kobayashi: A linear time algorithm for the induced disjoint paths problem in planar graphs, *Journal of Computer and System Sciences*, 78 (2012), pp. 670–680.
14. K. Kawarabayashi and Y. Kobayashi: An immersion of a square in 4-edge-connected graphs, *Progress in Informatics*, 9 (2012), pp. 35–36.
15. Y. Yoshida and Y. Kobayashi: Testing the  $(s, t)$ -disconnectivity of graphs and digraphs, *Theoretical Computer Science*, 434 (2012), pp. 98–113.
16. Y. Kobayashi and X. Yin: An algorithm for finding a maximum  $t$ -matching excluding complete partite subgraphs, *Discrete Optimization*, 9 (2012), pp. 98–108.
17. Y. Kobayashi and Y. Yoshida: Algorithms for finding a maximum non- $k$ -linked graph, *SIAM Journal on Discrete Mathematics*, 26 (2012), pp. 591–604.
18. Y. Kobayashi, J. Szabó, and K. Takazawa: A proof of Cunningham’s conjecture on restricted subgraphs and jump systems, *Journal of Combinatorial Theory, Series B*, 102 (2012), pp. 948–966.
19. K. Kawarabayashi and Y. Kobayashi: Fixed-parameter tractability for the subset feedback set problem and the  $S$ -cycle packing problem, *Journal of Combinatorial Theory, Series B*, 102 (2012), pp. 1020–1034.
20. Y. Kobayashi, K. Murota, and R. Weismantel: Cone superadditivity of discrete convex functions, *Mathematical Programming, Series A*, 135 (2012), pp. 25–44.
21. K. Kawarabayashi and Y. Kobayashi: An  $O(\log n)$ -approximation algorithm for the edge-disjoint paths problem in Eulerian planar graphs, *ACM Transactions on Algorithms*, 9 (2013), Article 16.

22. R. Fujita, Y. Kobayashi, and K. Makino: Robust matchings and matroid intersections, *SIAM Journal on Discrete Mathematics*, 27 (2013), pp. 1234–1256.
23. Y. Kobayashi: Triangle-free 2-matchings and M-concave functions on jump systems, *Discrete Applied Mathematics*, 175 (2014), pp. 35–42.
24. A. Kawamura and Y. Kobayashi: Fence patrolling by mobile agents with distinct speeds, *Distributed Computing*, 28 (2015), pp. 147–154.
25. H. Flier, Y. Kobayashi, M. Mihalák, A. Schöbel, P. Widmayer, and A. Zych, Selecting vertex disjoint paths in plane graphs, *Networks*, 66 (2015), pp. 136–144.
26. K. Kawarabayashi and Y. Kobayashi: The edge disjoint paths problem in Eulerian graphs and 4-edge-connected graphs, *Combinatorica*, 35 (2015), pp. 477–495.
27. Y. Kobayashi: The complexity of minimizing the difference of two  $M^1$ -convex set functions, *Operations Research Letters*, 43 (2015), pp. 573–574.
28. K. Ishihara and Y. Kobayashi: Routing algorithms under mutual interference constraints, *Journal of the Operations Research Society of Japan*, 58 (2015), pp. 209–222.
29. A. Bernáth, Y. Kobayashi, and T. Matsuoka: The generalized terminal backup problem, *SIAM Journal on Discrete Mathematics*, 29 (2015), pp. 1764–1782.
30. K. Otsuki, Y. Kobayashi, and K. Murota: Improved max-flow min-cut algorithms in a circular disk failure model with application to a road network, *European Journal of Operational Research*, 248 (2016), pp. 396–403.
31. K. Kawarabayashi and Y. Kobayashi: Edge-disjoint odd cycles in 4-edge-connected graphs, *Journal of Combinatorial Theory, Series B*, 119 (2016), pp. 12–27.
32. K. Bérczi, T. Király, and Y. Kobayashi: Covering intersecting bi-set families under matroid constraints, *SIAM Journal on Discrete Mathematics*, 30 (2016), pp. 1758–1774.
33. K. Kawarabayashi and Y. Kobayashi: An improved approximation algorithm for the edge-disjoint paths problem with congestion two, *ACM Transactions on Algorithms*, 13 (2016), Article 5.
34. Y. Kobayashi and S. Toyooka: Finding a shortest non-zero path in group-labeled graphs via permanent computation, *Algorithmica*, 77 (2017), pp. 1128–1142.
35. N. Kakimura, K. Kawarabayashi, and Y. Kobayashi: Packing edge-disjoint odd Eulerian subgraphs through prescribed vertices in 4-edge-connected graphs, *SIAM Journal on Discrete Mathematics*, 31 (2017), pp. 766–782.
36. T. Ito, N. Kakimura, N. Kamiyama, Y. Kobayashi, and Y. Okamoto: Efficient stabilization of cooperative matching games, *Theoretical Computer Science*, 677 (2017), pp. 69–82.
37. K. Bérczi and Y. Kobayashi: An algorithm for identifying cycle-plus-triangles graphs, *Discrete Applied Mathematics*, 226 (2017), pp. 10–16.
38. Y. Kobayashi and K. Takazawa: Randomized strategies for cardinality robustness in the knapsack problem, *Theoretical Computer Science*, 699 (2017), pp. 53–62.
39. H. Nishiyama, Y. Kobayashi, Y. Yamauchi, S. Kijima, and M. Yamashita: The parity Hamiltonian cycle problem, *Discrete Mathematics*, 341 (2018), pp. 606–626.

40. T. N. Hau, N. Kakimura, K. Kawarabayashi, Y. Kobayashi, T. Matsuoka, Y. Yokoi: Optimal cache placement for an academic backbone network, *Journal of the Operations Research Society of Japan*, 61 (2018), pp. 197–216.
41. T. Ito, N. Kakimura, N. Kamiyama, Y. Kobayashi, and Y. Okamoto: Reconfiguration of maximum-weight  $b$ -matchings in a graph, *Journal of Combinatorial Optimization*, to appear.
42. T. Ito, N. Kakimura, N. Kamiyama, Y. Kobayashi, and Y. Okamoto: Minimum-cost  $b$ -edge dominating sets on trees, *Algorithmica*, to appear.
43. K. Kawarabayashi and Y. Kobayashi: All-or-nothing multicommodity flow problem with bounded fractionality in planar graphs, *SIAM Journal on Computing*, to appear.
44. Y. Kobayashi: NP-hardness and fixed-parameter tractability of the minimum spanner problem, *Theoretical Computer Science*, to appear.

### *Refereed Conference Proceedings*

1. K. Kawarabayashi and Y. Kobayashi: The induced disjoint paths problem, *Proceedings of the 13th Conference on Integer Programming and Combinatorial Optimization (IPCO 2008)*, LNCS 5035, 2008, pp. 47–61.
2. Y. Kobayashi and K. Kawarabayashi: Algorithms for finding an induced cycle in planar graphs and bounded genus graphs, *Proceedings of the 20th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2009)*, 2009, pp. 1146–1155.
3. S. Imahori, Y. Miyamoto, H. Hashimoto, Y. Kobayashi, M. Sasaki, and M. Yagiura: The complexity of the node capacitated in-tree packing problem, *Proceedings of the International Network Optimization Conference 2009*, 2009.
4. Y. Kobayashi and C. Sommer: On shortest disjoint paths in planar graphs, *Proceedings of the 20th International Symposium on Algorithms and Computation (ISAAC 2009)*, LNCS 5878, 2009, pp. 293–302.
5. K. Kawarabayashi and Y. Kobayashi: The edge disjoint paths problem in Eulerian graphs and 4-edge-connected graphs, *Proceedings of the 21st Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2010)*, 2010, pp. 345–353.
6. K. Kawarabayashi and Y. Kobayashi: An  $O(\log n)$ -approximation algorithm for the disjoint paths problem in Eulerian planar graphs and 4-edge-connected planar graphs, *Proceedings of the 13th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX 2010)*, LNCS 6302, 2010, pp. 274–286.
7. K. Kawarabayashi and Y. Kobayashi: Improved algorithm for the half-disjoint paths problem, *Proceedings of the 13th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX 2010)*, LNCS 6302, 2010, pp. 287–297.
8. R. Fujita, Y. Kobayashi, and K. Makino: Robust matchings and matroid intersections, *Proceedings of the 18th Annual European Symposium on Algorithms (ESA 2010)*, LNCS 6347, 2010, pp. 123–134.
9. K. Kawarabayashi and Y. Kobayashi: Breaking  $O(n^{1/2})$ -approximation algorithms for the edge-disjoint paths problem with congestion two, *Proceedings of the 43rd ACM Symposium on Theory of Computing (STOC 2011)*, 2011, pp. 81–88.
10. Y. Kobayashi and Y. Yoshida: Algorithms for finding a maximum non- $k$ -linked graph, *Proceedings of the 19th European Symposium on Algorithms (ESA 2011)*, LNCS 6942, 2011, pp. 131–142.

11. N. Kakimura, K. Kawarabayashi, and Y. Kobayashi: Erdős-Pósa property and its algorithmic applications — parity constraints, subset feedback set, and subset packing, *Proceedings of the 23rd Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2012)*, 2012, pp. 1726–1736.
12. K. Kawarabayashi and Y. Kobayashi: List-coloring graphs without subdivisions and without immersions, *Proceedings of the 23rd Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2012)*, 2012, pp. 1425–1435.
13. K. Kawarabayashi and Y. Kobayashi: Edge-disjoint odd cycles in 4-edge-connected graphs, *Proceedings of the 29th Symposium on Theoretical Aspects of Computer Science (STACS 2012)*, 2012, pp. 206–217.
14. K. Kawarabayashi and Y. Kobayashi: Linear min-max relation between the treewidth of H-minor-free graphs and its largest grid minor, *Proceedings of the 29th Symposium on Theoretical Aspects of Computer Science (STACS 2012)*, 2012, pp. 278–289.
15. A. Kawamura and Y. Kobayashi: Fence patrolling by mobile agents with distinct speeds, *Proceedings of the 23rd International Symposium on Algorithms and Computation (ISAAC 2012)*, LNCS 7676, 2012, pp. 598–608.
16. K. Kawarabayashi and Y. Kobayashi: All-or-nothing multicommodity flow problem with bounded fractionality in planar graphs, *Proceedings of the 54th Annual IEEE Symposium on Foundations of Computer Science (FOCS 2013)*, 2013, pp. 187–196.
17. A. Bernáth and Y. Kobayashi: The generalized terminal backup problem, *Proceedings of the 25th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2014)*, 2014, pp. 1678–1686.
18. Y. Kobayashi and K. Otsuki: Max-flow min-cut theorem and faster algorithms in a circular disk failure model, *Proceedings of the 33rd Annual IEEE International Conference on Computer Communications (INFOCOM 2014)*, 2014, pp. 1635–1643.
19. K. Kawarabayashi, Y. Kobayashi, and S. Kreutzer: An excluded half-integral grid theorem for digraphs and the directed disjoint paths problem, *Proceedings of the 46th ACM Symposium on Theory of Computing (STOC 2014)*, 2014, pp. 70–78.
20. T. Ito, N. Kakimura, N. Kamiyama, Y. Kobayashi, and Y. Okamoto: Minimum-cost  $b$ -edge dominating sets on trees, *Proceedings of the 25th International Symposium on Algorithms and Computation (ISAAC 2014)*, LNCS 8889, 2014, pp. 195–207.
21. Y. Kawase, Y. Kobayashi, and Y. Yamaguchi: Finding a path in group-labeled graphs with two labels forbidden, *Proceedings of the 42nd International Colloquium on Automata, Languages, and Programming (ICALP 2015)*, 2015, pp. 797–809.
22. Y. Kobayashi and K. Takazawa: Randomized strategies for cardinality robustness in the knapsack problem, *Proceedings of the 13th Meeting on Analytic Algorithmics and Combinatorics (ANALCO 2016)*, 2016, pp. 25–33.
23. T. Ito, N. Kakimura, N. Kamiyama, Y. Kobayashi, and Y. Okamoto: Efficient stabilization of cooperative matching games, *Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2016)*, 2016, pp. 41–49.
24. S. Iwata and Y. Kobayashi: A weighted linear matroid parity algorithm, *Proceedings of the 49th ACM Symposium on Theory of Computing (STOC 2017)*, 2017, pp. 264–276.
25. T. Ito, N. Kakimura, N. Kamiyama, Y. Kobayashi, and Y. Okamoto: Reconfiguration of maximum-weight  $b$ -matchings in a graph, *Proceedings of the 23rd Annual International Computing and Combinatorics Conference (COCOON 2017)*, pp. 287–296.

26. T. Ito, N. Kakimura, N. Kamiyama, Y. Kobayashi, Y. Okamoto, and T. Shiitada: Tight approximability of the server allocation problem for real-time applications, *Proceedings of the 3rd International Workshop on Algorithmic Aspects of Cloud Computing (Algocloud 2017)*, pp. 41–55.
27. K. Bérczi and Y. Kobayashi: The directed disjoint shortest paths problem, *Proceedings of the 25th European Symposium on Algorithms (ESA 2017)*, 13:1–13.13.
28. T. Ito, N. Kakimura, and Y. Kobayashi: Complexity of the multi-service center problem, *Proceedings of the 28th International Symposium on Algorithms and Computation (ISAAC 2017)*, 48:1–48:12.
29. K. Takayama and Y. Kobayashi: A strongly polynomial time algorithm for the maximum supply rate problem on trees, *Proceedings of the 12th International Frontiers of Algorithmics Workshop (FAW 2018)*, pp. 54–57.