

CURRICULUM VITAE

February 5, 2025

Name **Goro AKAGI**

Present Position Full Professor at Tohoku University, Japan

Contact

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Education

- April 1994 - March 1998
Undergraduate School, Department of Physics, Waseda University, Tokyo, Japan
B. Sci. (advisor M. Ôtani), Waseda University, March 1998.
- April 1998 - September 2004
Graduate School, Department of Physics, Waseda University, Tokyo, Japan
M. Sci. (advisor M. Ôtani), Waseda University, March 2000.
D. Sci. (advisor M. Ôtani), Waseda University, September 2004.

Employment

- April 2002 - March 2005
Research Associate, Media Network Center,
Waseda University, Tokyo, Japan
- April 2005 - March 2006
Post Doctoral Researcher, College of Humanities and Sciences,
Nihon University, Tokyo, Japan
- April 2006 - March 2009
Assistant Professor (Lecturer), Department of Machinery and Control
Systems,
School of Systems Engineering,
Shibaura Institute of Technology, Saitama, Japan
- April 2009 - March 2011
Associate Professor, Department of Machinery and Control Systems,
School of Systems Engineering and Science,
Shibaura Institute of Technology, Saitama, Japan

- April 2011 - March 2016
Associate Professor, Graduate School of System Informatics,
Kobe University, Kobe, Japan
- April 2016 - Present
Full Professor, Mathematical Institute,
Tohoku University, Sendai, Japan
- October 2021 - September 2022
Contract Professor, Dipartimento di Matematica,
Università degli Studi di Pavia, Pavia, Italy

Long-term Research Stays (\geq one month)

- September 2015 - September 2016
Research Fellow, Alexander von Humboldt Foundation,
Helmholtz Zentrum München / Technische Universität München (TUM),
Munich, Germany.
- October 2017 - March 2018
Research Fellow, Alexander von Humboldt Foundation,
Helmholtz Zentrum München / Technische Universität München (TUM),
Munich, Germany.

Professional Affiliations

- Member of Mathematical Society of Japan
- Member of Japan Society for Industrial and Applied Mathematics (JSIAM)

Editorial boards

- Journal of the Mathematical Society of Japan (JMSJ), Editor, July 2024 – Present
- Tohoku Mathematical Journal, Associate Editor, April 2016 – Present
- Proceedings of the Institute of Mathematics and Mechanics (PIMM), International Editorial Advisory Board, April 2018 – Present

Personalia Born in 1975, Japan

References Available upon request

AWARDS

- 2022 January - Present
Specially Appointed Professor, Institute of Modern Analysis, Shizuoka University
- Carl Friedrich von Siemens Research Fellowship of the Alexander von Humboldt Foundation for Experienced Researchers, Alexander von Humboldt Foundation, 2015.
- The 6th Hukuhara Prize, Division of Functional Equations (a division of Mathematical Society of Japan), 2014.

GRANTS

KAKENHI funded by Japan Society for the Promotion of Science

- Grant-in-Aid for Scientific Research (A), #24H00184, 2024-2028
“Evolution equations describing singularities of non-equilibrium systems beyond the linear-response regime and development of nonlocal-nonlinear analysis”
- Fund for the Promotion of Joint International Research (Fostering Joint International Research (B)), #21KK0044, 2021–2026
“Quantitative analysis for nonlinear evolution equations of diffusion type”
- Grant-in-Aid for Challenging Research (Exploratory) #21K18581, 2021–2023
“Evolution equations with the coexistence of fractional derivatives and nonlinear structures – perturbation theory and asymptotic analysis of solutions _”
- Grant-in-Aid for Scientific Research (B), #20H01812, 2020–2023
“Evolution equations describing non-standard irreversible processes –Analysis on singularities emerging in the dynamics of solutions–”
- Grant-in-Aid for Challenging Exploratory Research, #18K18715, 2018–2020
“Evolution equations with the coexistence of fractional derivatives and nonlinear structures”
- Grant-in-Aid for Scientific Research (B), #16H03946, 2016–2019
“Evolution equations describing nonstandard irreversible processes”
- Grant-in-Aid for Scientific Research (C), #25400163, 2013–2015
“Evolution equations describing anomalous diffusion”

- Grant-in-Aid for Young Scientists (B), #22740093, 2010–2012
“Asymptotic behaviors of solutions for evolution equations involving nonlinear Laplacians”
- Grant-in-Aid for Young Scientists (B), #19740073, 2007–2009
“Evolution equations involving nonlinear Laplacians”

Other Funds

- Invitational Fellowship for Research in Japan (short-term), Japan Society for the Promotion of Science, 2022
Vasile Staicu (Professor at University of Aveiro) “Quantitative analysis of solutions to PDEs with degeneracy and singularity”
- Invitational Fellowship for Research in Japan (short-term), Japan Society for the Promotion of Science, 2020
Stefan Neukamm (Professor at Technische Universität Dresden) “Quantitative stochastic homogenization for nonlinear evolution”
- JSPS-CNR Joint Research Project, Japan Society for the Promotion of Science, 2014–2015
“Innovative variational methods for evolution equations”
- JSPS-CNR Joint Research Project, Japan Society for the Promotion of Science, 2012–2013
“Innovative variational methods for evolution partial differential equations”
- Research Fund, Hyogo Science and Technology Association, 2012
“A new variational method for non-equilibrium systems with energy dissipation and applications”
- Research Fund, Nikko Co. Ltd, 2012
“Simulation of fluid diffusion in porous medium”

LIST OF PUBLICATIONS

Journal

1. Lyapunov stability of non-isolated equilibria for strongly irreversible Allen-Cahn equations, to appear in Proceedings of the Royal Society of Edinburgh Section A: Mathematics. (with M. Efendiyev)
2. On a class of doubly nonlinear evolution equations in Musielak-Orlicz spaces, *Mathematische Nachrichten* **297** (2024), Issue 7, 2686–2729. (with G. Schimperna)
3. Generalized gradient flows for time-dependent energies and applications to PDEs involving variable exponents, *Nonlinear Differential Equations and Applications NoDEA* **31** (2024), article number 73. (with N. Tanaka)
4. Steady states with jump discontinuity in a receptor-based model with hysteresis in higher-dimensional domains, *SIAM Journal on Mathematical Analysis* **56** (2024), no.2, 1996–2033. (with I. Takagi, C. Zhang)
5. On some doubly-nonlinear parabolic equations posed in \mathbb{R}^d , *Discrete and Continuous Dynamical Systems - Series S* **16** (2023), no.12, 3661–3676.
6. Evolution equations with complete irreversibility and energy conservation, *Journal of Mathematical Analysis and Applications* **527** (2023), 127348 (31pp.). (with K. Sato)
7. Space-time homogenization for nonlinear diffusion, *Journal of Differential Equations* **358** (2023), 386–456. (with T. Oka)
8. General framework to construct local-energy solutions of nonlinear diffusion equations for growing initial data, *Journal of Functional Analysis* **284** (2023) 109891 (86pp.). (with K. Ishige and R. Sato)
9. Rates of convergence to non-degenerate asymptotic profiles for fast diffusion via energy methods, *Archive for Rational Mechanics and Analysis* **247** (2023), Article number: 23 (38pp.).
10. Space-time homogenization problems for porous medium equations with non-negative initial data, *Advances in Mathematical Sciences and Applications* **31** (2022), no.1, 1–19. (with T. Oka)
11. Traveling wave dynamics for Allen-Cahn equations with strong irreversibility, *Transactions of the American Mathematical Society* **275** (2022), no.5, 3173–3238. (with C. Kuehn and K.-I. Nakamura)
12. Local well-posedness for Frémond’s model of complete damage in elastic solids, *European Journal of Applied Mathematics* **33** (2022), no. 2, 309–327. (with G. Schimperna)

13. The Cauchy problem for the Finsler heat equation, *Advances in Calculus of Variations* **13** (2020), no. 3, 257–278. (with K. Ishige, R. Sato)
14. Fractional flows driven by subdifferentials in Hilbert spaces, *Israel Journal of Mathematics* **234** (2019), no.2, 809–862.
15. Allen-Cahn equation with strong irreversibility, *European Journal of Applied Mathematics* **30** (2019), no.4, 707–755. (with M. Efendiev)
16. Convergence of solutions for the fractional Cahn-Hilliard system, *Journal of Functional Analysis* **276** (2019), no.9, 2663–2715. (with G. Schimperna, A. Segatti)
17. Porous medium equation with a blow-up nonlinearity and a non-decreasing constraint, *Nonlinear Differential Equations and Applications (NoDEA)*, accepted. (with S. Melchionna)
18. Unidirectional evolution equations of diffusion type, *Journal of Differential Equations* **266** (2019), no.1, 1–41. (with M. Kimura)
19. Quantitative estimates on localized finite differences for the fractional Poisson problem, and applications to regularity and spectral stability, *Communications in Mathematical Sciences* **16** (2018), no.4, 913–961. (with G. Schimperna, A. Segatti and L. Spinolo)
20. Elliptic-regularization of nonpotential perturbations of doubly-nonlinear flows of nonconvex energies: A variational approach, *Journal of Convex Analysis* **25** (2018), no.3, 861–898. (with S. Melchionna)
21. Weighted energy-dissipation approach to doubly-nonlinear problems on the half line, *Journal of Evolution Equations* **18** (2018), no.1, 49–74. (with S. Melchionna and U. Stefanelli)
22. Fractional Cahn-Hilliard, Allen-Cahn and porous medium equations, *Journal of Differential Equations* **261** (2016), 2935–2985. (with G. Schimperna and A. Segatti)
23. Stability of non-isolated asymptotic profiles for fast diffusion, *Communications in Mathematical Physics* **345** (2016), no.1, 077–100.
24. A variational principle for gradient flows of nonconvex energies, *Journal of Convex Analysis* **23** (2016), no.1, 053–075. (with U. Stefanelli)
25. Stability of stationary solutions for semilinear heat equations with concave nonlinearity, *Communications in Contemporary Mathematics* **17** (2015), no.6, 1550001 (29 pages). (with R. Kajikiya)
26. Symmetry and stability of asymptotic profiles for fast diffusion equations in annuli, *Annales de l’Institut Henri Poincaré (C) Analyse Non Linéaire* **31** (2014), no.6 1155–1173. (with R. Kajikiya)

27. Local solvability of a fully nonlinear parabolic equation, *Kodai Mathematical Journal* **37** (2014), no.3, 702–727.
28. Subdifferential calculus and doubly nonlinear evolution equations in L^p -spaces with variable exponents, *Journal of Functional Analysis* **267** (2014), no.1, 173–213. (with G. Schimperna)
29. Doubly nonlinear evolution equations as convex minimization problems, *SIAM Journal on Mathematical Analysis* **46** (2014), no.3, 1922–1945. (with U. Stefanelli)
30. Doubly nonlinear parabolic equations involving variable exponents, *Discrete and Continuous Dynamical Systems, Series S* **7** (2014) no.1, 1–16.
31. Stability analysis of asymptotic profiles for sign-changing solutions to fast diffusion equations, *Manuscripta Mathematica* **141** (2013) no.3-4, 559–587. (with R. Kajikiya)
32. Nonlinear diffusion equations driven by the $p(\cdot)$ -Laplacian, *Nonlinear Differential Equations and Applications (NoDEA)* **20** (2013) no.1, 37–64. (with K. Matsuura)
33. Periodic solutions for doubly nonlinear evolution equations, *Journal of Differential Equations* **251** (2011) no.7, 1790–1812. (with U. Stefanelli)
34. Weighted energy-dissipation functionals for doubly nonlinear evolution, *Journal of Functional Analysis* **260** (2011) no.9, 2541–2578. (with U. Stefanelli)
35. Global attractors for doubly nonlinear evolution equations with non-monotone perturbations, *Journal of Differential Equations* **250** (2011) no.4, 1850–1875.
36. Maximal monotonicity of the sum of two subdifferential operators in L^p -spaces, to appear in *Nonlinear Analysis, TMA* **74** (2011) no.5, 1664–1671.
37. Doubly nonlinear evolution equations with non-monotone perturbations in reflexive Banach spaces, *Journal of Evolution Equations* **11** (2011) no.1, 1–41.
38. A variational principle for doubly nonlinear evolution, *Applied Mathematics Letters* **23** (2010) no.9, 1120–1124. (with U. Stefanelli)
39. Asymptotic behavior of viscosity solutions for a degenerate parabolic equation associated with the infinity-Laplacian, *Mathematische Annalen* **343** (2009) no.4, 921–953. (with P. Juutinen and R. Kajikiya)
40. Existence and uniqueness of viscosity solutions for a degenerate parabolic equation associated with the infinity-Laplacian, *Calculus of Variations and Partial Differential Equations* **31** (2008) no.4, 457–471. (with K. Suzuki)

41. Local existence of solutions to some degenerate parabolic equation associated with the p -Laplacian, *Journal of Differential Equations* **241** (2007) no.2, 359–385.
42. Doubly nonlinear evolution equations governed by time-dependent subdifferentials in reflexive Banach space, *Journal of Differential Equations* **231** (2006) no.1, 32–56.
43. Evolution inclusions governed by the difference of two subdifferentials in reflexive Banach spaces, *Journal of Differential Equations* **209** (2005) no.2, 392–415. (with M. Ôtani)
44. Convergence of functionals and its applications to parabolic equations, *Abstract and Applied Analysis* **2004** (2004) no.11, 907–933.
45. Time-dependent constraint problems arising from macroscopic critical-state models for type-II superconductivity and their approximations, *Advances in Mathematical Sciences and Applications* **14** (2004) no.2, 683–712. (with M. Ôtani)
46. Evolution inclusions governed by subdifferentials in reflexive Banach spaces, *Journal of Evolution Equations* **4** (2004) no.4, 519–541. (with M. Ôtani)

Book Chapter

1. Fractional Dissipative PDEs, In: *Fractional Dispersive Models and Applications - Recent Developments and Future Perspectives* - (Ed. P.G. Kevrekidis, J. Cuevas-Maraver), *Nonlinear Systems and Complexity* (NSCH, volume 37), Springer Cham, to appear. (with F. Achleitner, C. Kuehn, J.M. Melenk, J.D.M. Rademacher, C. Soresina, J. Yang)

Proceedings

1. Nondecreasing solutions to doubly nonlinear equations, “Solvability, regularity, and optimal control of boundary value problems for PDEs” *Springer INdAM Ser.*, vol.22, Springer, Cham, 2017, pp.31–53. (with U. Stefanelli)
2. Stability analysis of asymptotic profiles for fast diffusion equations, *The 4th MSJ-SI “Nonlinear Dynamics in Partial Differential Equations” Advanced Studies in Pure Mathematics* **64** (2014), 183–191. (with R. Kajikiya)
3. A minimization approach to gradient flows of nonconvex energies, “Nonlinear Analysis and Interdisciplinary Sciences”, *GAKUTO International Series, Mathematical Sciences and Applications*, vol.36, 2013, pp.1–16.
4. Stability and instability of group invariant asymptotic profiles for fast diffusion equations, “Geometric Properties for Parabolic and Elliptic PDE’s” (R. Magnanini, S. Sakaguchi, A. Alvino Eds.), *Springer INdAM Series*, 2013, pp.1–16.

5. Well-posedness and large-time behaviors of solutions for a parabolic equation involving $p(x)$ -Laplacian, “The Eighth International Conference on Dynamical Systems and Differential Equations”, a supplement volume of Discrete and Continuous Dynamical Systems, 2011, pp.22–31. (with K. Matsuura)
6. On some doubly nonlinear parabolic equations, GAKUTO International Series, Mathematical Sciences and Applications, Gakko-Tosho, vol.32, 2010, pp.239–254.
7. Energy solutions of the Cauchy-Neumann problem for porous medium equations, “The Seventh International Conference on Dynamical Systems and Differential Equations”, a supplement volume of Discrete and Continuous Dynamical Systems, 2009, pp.1–10.
8. Doubly nonlinear evolution equations in reflexive Banach spaces, “Nonlinear Phenomena with Energy Dissipation”, GAKUTO International Series, Mathematical Sciences and Applications, vol.29, 2008, pp.19–36.
9. Doubly nonlinear evolution equations with non-monotone perturbations, Proc. Appl. Math. Mech., **7** (2007) no.1, 2040047–2040048.
10. On a certain degenerate nonlinear parabolic equation associated with the infinity-Laplacian, “The Sixth International Conference on Dynamical Systems and Differential Equations”, a supplement volume of Discrete and Continuous Dynamical Systems, 2007, pp.18–27. (with K. Suzuki)
11. Doubly nonlinear evolution equations and Bean’s critical-state model for type-II superconductivity, “The Fifth International Conference on Dynamical Systems and Differential Equations”, a supplement volume of Discrete and Continuous Dynamical Systems, 2005, pp.30–39.
12. On some macroscopic models for type-II superconductivity, “The Fourth World Congress of Nonlinear Analysts”, a supplement volume of Nonlinear Analysis, **63** (2005), pp.e1155–e1166. (with M. Ôtani)
13. Subdifferential approach to degenerate parabolic equations, “Mathematical Approach to Nonlinear Phenomena”, GAKUTO International Series, Mathematical Sciences and Applications, vol.23, 2005, pp.9–24.
14. Asymptotic behavior of solutions for parabolic equations associated with p -Laplacian as p tends to infinity, “Nonlinear Partial Differential Equations and Their Applications”, GAKUTO International Series, Mathematical Sciences and Applications, vol.20, 2004, pp.418–429.
15. Evolution equations and subdifferentials in Banach spaces, “The Fourth International Conference on Dynamical Systems and Differential Equations”, a supplement volume of Discrete and Continuous Dynamical Systems, 2003, pp.11–20. (with M. Ôtani)

INTENSIVE COURSES

- **Nonlinear Diffusion Equations** for graduate students of mathematics course, Kyoto University, Japan, Oct 2024.
- **Topics in Differential Equations** for undergraduates of engineering course, Iwate University, Japan, Nov and Dec 2023 / Nov 2024.
- **Nonlinear Diffusion Equations** for graduate students of mathematics course, University of Pavia, Italy, Apr and Jun 2022.
- **Nonlinear Diffusion Equations – Long-time behavior of solutions and Stability Analysis** – for graduate students of mathematics course, The University of Tokyo, Japan, Jan 2019.
- **Nonlinear Diffusion Equations – Long-time behavior of solutions and Stability Analysis** – for undergraduates and graduate students of mathematics course, Tokyo Institute of Technology, Japan, Dec 2018.
- **Diffusion and Nonlinear Diffusion Equations** for undergraduates of mathematics course, Osaka Prefectural University, Japan, Aug 2014.
- **Introduction to Doubly Nonlinear Evolution Equations** for graduate students of mathematics course, Kyushu University, Japan, 2012.
- **Introduction to Nonlinear Evolution Equations** for graduate students of mathematics course, Meiji University, Japan, 2009, 2010.
- **Introduction to Nonlinear Evolution Equations** for graduate students of mathematics course, Saitama University, Japan, 2008.