

## CURRICULUM VITAE

January 25, 2023

**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

- Tohoku Mathematical Journal, associate editor, April 2016 – Present
- Proceedings of the Institute of Mathematics and Mechanics (PIMM), 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**

- 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. Rates of convergence to non-degenerate asymptotic profiles for fast diffusion via energy methods, *Archive for Rational Mechanics and Analysis*, accepted.
2. 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)
3. 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)
4. 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)
5. The Cauchy problem for the Finsler heat equation, *Advances in Calculus of Variations* **13** (2020), no. 3, 257–278. (with K. Ishige, R. Sato)
6. Fractional flows driven by subdifferentials in Hilbert spaces, *Israel Journal of Mathematics* **234** (2019), no.2, 809–862.
7. Allen-Cahn equation with strong irreversibility, *European Journal of Applied Mathematics* **30** (2019), no.4, 707–755. (with M. Efendiev)
8. Convergence of solutions for the fractional Cahn-Hilliard system, *Journal of Functional Analysis* **276** (2019), no.9, 2663–2715. (with G. Schimperna, A. Segatti)
9. Porous medium equation with a blow-up nonlinearity and a non-decreasing constraint, *Nonlinear Differential Equations and Applications (NoDEA)*, accepted. (with S. Melchionna)
10. Unidirectional evolution equations of diffusion type, *Journal of Differential Equations* **266** (2019), no.1, 1–41. (with M. Kimura)
11. 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)
12. 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)

13. 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)
14. Fractional Cahn-Hilliard, Allen-Cahn and porous medium equations, *Journal of Differential Equations* **261** (2016), 2935–2985. (with G. Schimperna and A. Segatti)
15. Stability of non-isolated asymptotic profiles for fast diffusion, *Communications in Mathematical Physics* **345** (2016), no.1, 077–100.
16. A variational principle for gradient flows of nonconvex energies, *Journal of Convex Analysis* **23** (2016), no.1, 053–075. (with U. Stefanelli)
17. 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)
18. 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)
19. Local solvability of a fully nonlinear parabolic equation, *Kodai Mathematical Journal* **37** (2014), no.3, 702–727.
20. 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)
21. Doubly nonlinear evolution equations as convex minimization problems, *SIAM Journal on Mathematical Analysis* **46** (2014), no.3, 1922–1945. (with U. Stefanelli)
22. Doubly nonlinear parabolic equations involving variable exponents, *Discrete and Continuous Dynamical Systems, Series S* **7** (2014) no.1, 1–16.
23. 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)
24. Nonlinear diffusion equations driven by the  $p(\cdot)$ -Laplacian, *Nonlinear Differential Equations and Applications (NoDEA)* **20** (2013) no.1, 37–64. (with K. Matsuura)
25. Periodic solutions for doubly nonlinear evolution equations, *Journal of Differential Equations* **251** (2011) no.7, 1790–1812. (with U. Stefanelli)
26. Weighted energy-dissipation functionals for doubly nonlinear evolution, *Journal of Functional Analysis* **260** (2011) no.9, 2541–2578. (with U. Stefanelli)

27. Global attractors for doubly nonlinear evolution equations with non-monotone perturbations, *Journal of Differential Equations* **250** (2011) no.4, 1850–1875.
28. 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.
29. Doubly nonlinear evolution equations with non-monotone perturbations in reflexive Banach spaces, *Journal of Evolution Equations* **11** (2011) no.1, 1–41.
30. A variational principle for doubly nonlinear evolution, *Applied Mathematics Letters* **23** (2010) no.9, 1120–1124. (with U. Stefanelli)
31. 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)
32. 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)
33. Local existence of solutions to some degenerate parabolic equation associated with the  $p$ -Laplacian, *Journal of Differential Equations* **241** (2007) no.2, 359–385.
34. Doubly nonlinear evolution equations governed by time-dependent subdifferentials in reflexive Banach space, *Journal of Differential Equations* **231** (2006) no.1, 32–56.
35. 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)
36. Convergence of functionals and its applications to parabolic equations, *Abstract and Applied Analysis* **2004** (2004) no.11, 907–933.
37. 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)
38. Evolution inclusions governed by subdifferentials in reflexive Banach spaces, *Journal of Evolution Equations* **4** (2004) no.4, 519–541. (with M. Ôtani)

## 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 course students of mathematics course, University of Pavia, Italy, Apr and June, 2022.
- **Nonlinear Diffusion Equations – Long-time behavior of solutions and Stability Analysis** – for graduate course students of mathematics course, The University of Tokyo, Japan, Jan. 2019.
- **Nonlinear Diffusion Equations – Long-time behavior of solutions and Stability Analysis** – for undergraduate and graduate course students of mathematics course, Tokyo Institute of Technology, Japan, Dec. 2018.
- **Diffusion and Nonlinear Diffusion Equations** for undergraduate students of mathematics course, Osaka Prefectural University, Japan, Aug. 2014.
- **Introduction to Doubly Nonlinear Evolution Equations** for graduate course students of mathematics course, Kyushu University, Japan, 2012.
- **Introduction to Nonlinear Evolution Equations** for graduate course students of mathematics course, Meiji University, Japan, 2009, 2010.
- **Introduction to Nonlinear Evolution Equations** for graduate course students of mathematics course, Saitama University, Japan, 2008.