Curriculum Vitae

(last updates: July 14, 2024)

Personal data

First name:	Takayuki
Last name:	Tatekawa
Gender:	Male
Nationality:	Japanese
Present Position:	Professor (tenured)
Present Affiliation:	National Institute of Technology, Kochi College
Present Address:	200-1 Monobe-Otsu, Nankoku, Kochi, 783-8508, JAPAN
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Academic degree

Date	Degree	University	Place
March 15, 1997	Bachelor of Science	Waseda University	Tokyo, Japan
March 15, 1999	Master of Science	Waseda University	Tokyo, Japan
March 15, 2002	Doctor of Science	Waseda University	Tokyo, Japan

Education

Period	Institute	Place
April 1993-March 1997	Undergraduate, Department of Physics, Waseda University	Tokyo, Japan
April 1997-March 1999	Master's Program, Department of Physics, Waseda University	Tokyo, Japan
April 1999-March 2002	Doctoral Program, Department of Physics, Waseda University	Tokyo, Japan

Doctor thesis

Title:	Structure Formation in the Universe and Statistics of Self-Gravitating Systems
Supervisor:	Professor Kei-ichi Maeda (Department of Physics, Waseda University)

Research and professional experience (full time)

Period	Position	Institute
April 2002-March 2005	Research Associate	Department of Physics, Waseda University
April 2006-March 2008	Lecturer	The Center for Continuing Professional Development, Kogakuin University
April 2009-March 2012	Postdoctoral Research Fellow	Center for Computational Science & e-Systems, Japan Atomic Energy Agency
April 2012-April 2016	Associate Professor	Center for Information Initiative, University of Fukui
April 2017-March 2018	Specially Appointed Assistant Professor	National Institute of Technology, Kochi College
April 2018-Mar 2023	Associate Professor	National Institute of Technology, Kochi College
April 2023-	Professor	National Institute of Technology, Kochi College

Research and professional experience (part-time)

Period	Position	Institute
April 2005-March 2006	Visiting Lecturer (part-time)	Department of Physics, Waseda University
April 2005-March 2009	Visiting Researcher	Research Institute for Science and Engineering, Waseda University
April 2005-March 2009	Part-time Lecturer	Department of Physics, Ochanomizu University
September 2005-March 2006	Part-time Lecturer	Faculty of Urban Liberal Arts, Tokyo Metropolitan University
April 2006-March 2008	Part-time Lecturer	Department of Physics, Waseda University
April 2008-March 2009	Part-time Lecturer	Department of Computer Science, Kogakuin University
June 2008-March 2009	Part-time Lecturer	Azabu High school
April 2012-	Adjunct Researcher	Research Institute for Science and Engineering, Waseda University

Short Visit

- Laboratory of physics, École normale Supérieure de Lyon (ENS-Lyon): September 2-24, 2004

Research Related Activities

- Member of The Physical Society of Japan
- Member of The Astronomical Society of Japan

- Member of The International Astronomical Union
- Refereeing for
  - Astron. Astrophys.
  - Astronomische Nachrichten
  - Class. Quant. Grav.
  - Euro. J. Phys.
  - Europhys. Lett.
  - Phys. Rev. D
  - Phys. Rev. Lett.
  - Prog. Theor. Phys.

Main Research Interests (Physics)

The number corresponds to that in publication list.

- Structure formation in the Universe
  - Lagrangian perturbation theory [4-7, 9, 10, 12, 13, 15, 22, B1, P1, P4, P5, P7]
  - Initial condition problem for cosmic N-body simulation [17, 23, 25, P10, P14]
- Statistical mechanics in self-gravitating system [1, 2, 8, 21, P2, P3, P9, P12]
- Post-Newtonian dynamics [24]
- Long-range interacting systems [3, 11, P6, P8, P11, P13]
- Dark energy models [14, 16]
- Cosmology based on quantum physics [18]
- Modified gravity models [19, 20]
- Gravitational lensing [26]
- Astrometry [27]

Main Research Interests (Computer science)

- Grid computing [1,2, P1-P4]
- Cloud computing (Distributed parallel computing)
- General Purpose Graphic Processing Unit (GPGPU)

Grants

- 2002-2003: Structure Formation in the Universe and Self-gravitating Systems
  (Waseda University Grant for Special Research Projects, Indivisual Reseach 2002A-868)
  2002-2003: 200,000 Yen
- 2003-2004: Structure Formation in the Universe and Fractal Analysis
  (Waseda University Grant for Special Research Projects, Indivisual Reseach 2003A-089)
  2003-2004: 388,000 Yen
- 2004-2006: Statistical mechanics in self-gravitating and long-range interacting systems
  (Grants-in-Aid for Scientific Research, Ministry of Education, Culture, Sports, Science and Technology, Japan; Young Scientists (B) 16740152)
  2004-2005: 2,300,000 Yen
  2005-2006: 1,400,000 Yen

- 2009-2011: Quasi-equilibrium evolution in self-gravitating and long-range interacting systems (Grants-in-Aid for Scientific Research, Ministry of Education, Culture, Sports, Science and Technology, Japan; Young Scientists (B) 21740188)
  2009-2010: 3,000,000 Yen
  2010-2011: 900,000 Yen

Scholarship

- April 1995-March 2002 Scholarship from the Japan Scholarship Foundation
  April 1995-March 1997 44,000 Yen/month
  April 1997-March 1999 83,000 Yen/month
  April 1999-March 2002 117,000 Yen/month
- 1995, 1996 Azusa Ono Memorial Scholarship (Waseda University)
  300,000 Yen/year
- 1999-2001 Scholarship for Doctoral Program students (Waseda University)
  150,000 Yen/year

Names of Reference (Physics)

- Kei-ichi Maeda: Department of Physics, Waseda University, Japan
- Masahiro Morikawa: Department of Physics, Ochanomizu University, Japan
- Masa-aki Sakagami: Graduate School of Human and Environmental Studies, Kyoto University, Japan

Publications (Physics)

Book chapter

[B1] T. Tatekawa and S. Mizuno
Analytic approaches to the structure formation in the accelerating universe
in "Dark Energy: Theories, Developments, and Implications"
(K. Lefebvre and R. Garcia eds.) (Nova Science Publishers, New York, 2010), 241-294

Refereed Article

[1] O. Iguchi, T. Kurokawa, M. Morikawa, A. Nakamichi, Y. Sota, T. Tatekawa, and K. Maeda
Statistical Mechanics of Self–Gravitating System : Cluster Expansion Method
Phys. Lett. A **260**, 4-9 (1999).

[2] T. Tatekawa and K. Maeda
Primordial fractal density perturbations and structure formation in the Universe : 1-Dimensional collisionless sheet model
Astrophys. J. **547**, 531-544 (2001).

[3] Y. Sota, O. Iguchi, M. Morikawa, T. Tatekawa, and K. Maeda
Origin of scaling structure and non-gaussian velocity distribution in self-gravitating ring model
Phys. Rev. E **64**, 056133 (2001).

[4] M. Morita and T. Tatekawa
Extenging Lagrangian perturbation theory to a fluid with velocity dispersion
Mon. Not. R. Astron. Soc. **328**, 815-828 (2001).

[5] T. Tatekawa, M. Suda, K. Maeda, M. Morita, and H. Anzai
Perturbation theory in Lagrangian hydrodynamics for a cosmological fluid with velocity dispersion
Phys. Rev. D **66**, 064014 (2002).

[6] T. Tatekawa
Density field in extended Lagrangian perturbation theory
Phys. Rev. D **69**, 084020 (2004).

[7] T. Tatekawa
Correspondence between the adhesion model and the velocity dispersion for the cosmological fluid
Phys. Rev. D **70**, 064010 (2004).

[8] O. Iguchi, Y. Sota, T. Tatekawa, A. Nakamichi, and M. Morikawa
Universal Non-Gaussian Velocity Distribution in Violent Gravitational Processes
Phys. Rev. E **71**, 016102 (2005).

[9] T. Tatekawa
Third-order perturbative solutions in the Lagrangian perturbation theory with pressure
Phys. Rev. D **71**, 044024 (2005).

[10] T. Tatekawa
Non-Gaussianity of one-point distribution functions in extended Lagrangian perturbation theory
JCAP **04**, 018 (2005).

[11] T. Tatekawa, F. Bouchet, T. Dauxois, and S. Ruffo
Thermodynamics of the self-gravitating ring model
Phys. Rev. E **71**, 056111 (2005).

[12] T. Tatekawa
Third-order perturbative solutions in the Lagrangian perturbation theory with pressure II: Effect of the transverse modes
Phys. Rev. D **72**, 024005 (2005).

[13] H. Sotani and T. Tatekawa
Comparison of the velocity distribution between the adhesion approximation and the Euler-Jeans-Newton model
Phys. Rev. D **73**, 024024 (2006).

[14] T. Tatekawa and S. Mizuno
Non-Gaussianity of the density distribution in accelerating universes
JCAP **02**, 006 (2006).

[15] T. Tatekawa
Improving the Lagrangian perturbative solution for cosmic fluid: Applying Shanks transformation
Phys. Rev. D **75**, 044028 (2007).

[16] T. Tatekawa and S. Mizuno
Non-Gaussianity of the density distribution in accelerating universes II: N-body simulations
JCAP **02**, 015 (2007).

[17] T. Tatekawa and S. Mizuno
Transients from initial conditions based on Lagrangian perturbation theory in N-body simulations
JCAP **12**, 014 (2007).

[18] T. Fukuyama, M. Morikawa, and T. Tatekawa
Cosmic structures via Bose Einstein condensation and its collapse
JCAP **06**, 033 (2008).

[19] S. Tsujikawa, and T. Tatekawa
The effect of modified gravity on weak lensing
Phys. Lett. B **665**, 325-331 (2008).

[20] T. Tatekawa and S. Tsujikawa
Second-order matter density perturbations and skewness in scalar-tensor modified gravity models
JCAP **09**, 009 (2008).

[21] T. Tashiro and T. Tatekawa
Brownian dynamics around the core of self-gravitating systems
J. Phys. Soc. Jpn. **79**, 063001 (2010).

[22] T. Tatekawa
Fourth-order perturbative equations in Lagrangian perturbation theory for cosmological dust fluid
Prog. Theor. Exp. Phys. 013E03 (2013).

[23] T. Tatekawa
Transients from initial conditions based on Lagrangian perturbation theory in N-body simulations II: the effect of the transverse mode
JCAP **04**, 025 (2014).

[24] T. Tatekawa
Accelerating N-body simulation of self-gravitating systems with limited first-order post-Newtonian approximation
Commun. Comput. Phys. **25**, 68-83 (2019).

[25] T. Tatekawa
Transients from Initial Conditions Based on Lagrangian Perturbation Theory in N-body Simulations III: The Case of GADGET-2 Code
Int. J. Mod. Phys. D, **29** (15), 2050096 (2020)

[26] T. Tatekawa and Y. Okamura
Detection of Intermediate-Mass Black Holes in Globular Clusters Using Gravitational Lensing
Stars and Galaxies, Vol. 3, id. 3 (2021)

[27] D. Kawata *et al.*
JASMINE: Near-infrared astrometry and time-series photometry science
Publ. Astron. Soc. Jpn., **76**, 386-425 (2024)

International Conference Proceedings

[P1] M. Morita and T. Tatekawa
Cosmological Jeans theory in Lagrangian coordinates
Proceedings of the 4th RESCEU International Symposium 381-382 (Universal academy press, Tokyo, 2001)

[P2] T. Tatekawa and K. Maeda *Primordial Fractal Density Fluctuation and Structure Formation of The Universe*
Proceedings of the 4th RESCEU International Symposium 429-430 (Universal academy press, Tokyo, 2001)

[P3] T. Tatekawa and K. Maeda
Primordial Fractal Density Perturbations and Structure Formation in The Universe: 1-dimensional collisionless sheet model
Proceedings of the Ninth Marcel Grossmann Meeting (MG9) 2015-2016 (World Scientific, Singapore, 2002)

[P4] T. Tatekawa
The Density Field in Extended Lagrangian Perturbation Theory
Proceedings of the 6th RESCEU International Symposium 507-508 (Universal academy press, Tokyo, 2004)

[P5] T. Tatekawa
Validity and Application of the Extended Lagrangian Perturbation Theory
Proceedings of 22nd Texas Symposium on Relativistic Astrophysics 1311 (SLAC Technical Publications, Stanford, 2005)

[P6] T. Tatekawa, F. Bouchet, T. Dauxois, and S. Ruffo
Thermodynamics of the self-gravitating ring model: Analyses with new iterative method
J. Phys.: Conf. Ser. **31**, 163-164 (2006)
THE THIRD 21COE SYMPOSIUM: ASTROPHYSICS AS INTERDISCIPLINARY SCIENCE

[P7] T. Tatekawa
Lagrangian description for the cosmic fluid
Proceedings of Relativistic Astrophysics and Cosmology - Einstein's Legacy - 56-58 (Springer-Verlag, 2007)

[P8] T. Tatekawa
Phase transition in d-dimensional long-range interacting systems
Comp. Phys. Comm. **177**, 190-190 (2007).
Proceedings of Conference on Computational Physics 2006 (CCP2006)

[P9] A. Nakamichi, T. Tatekawa, and M. Morikawa
Statistical mechanics of SDSS galaxy distribution and cosmological N-body simulations
AIP Conference Proceedings **965**, 267-272 (2007).
Proceedings of COMPLEXITY, METASTABILITY, AND NONEXTENSIVITY: An International Conference

[P10] T. Tatekawa and S. Mizuno
Initial condition problem for cosmological N-body simulations
EAS Publication Series, **36**, 109-110 (2009).
Proceedings of "Dark Energy and Dark Matter"

[P11] E. Konishi, M. Sakagami, and T. Tatekawa
Core-Halo Structure of Quasi-Stationary States in the Hamiltonian Mean Field Model
Advances in Science, Technology and Environmentology, Research Institute for Science and Engineering, Waseda University, Vol. B11 (2015.3) 141-142
Special Issue on New Challenges in Complex Systems Science

[P12] T. Tashiro and T. Tatekawa
Universal structure of self-gravitating systems not depending on dimensions and its physics
Advances in Science, Technology and Environmentology, Research Institute for Science and Engineering, Waseda University, Vol. B11 (2015.3) 189-192
Special Issue on New Challenges in Complex Systems Science

[P13] T. Tatekawa
The relation between order of phase transition and characteristic properties in SGR models
Advances in Science, Technology and Environmentology, Research Institute for Science and Engineering, Waseda University, Vol. B11 (2015.3) 193-196
Special Issue on New Challenges in Complex Systems Science

[P14] T. Tatekawa and S. Mizuno
Higher-order Lagrangian perturbative theory for the Cosmic Web
Proceedings of the International Astronomical Union, Volume 11, Issue S308 (The Zeldovich Universe: Genesis and Growth of the Cosmic Web) (2016) 119-120

Invited Talk

[I1] T. Tatekawa
Equilibrium and quasi-equilibrium state in long-range interacting systems
Slovenia-Japan AICS Mini-Symposium "Nonlinear Phenomena in Complex Systems" (Nov. 2007, Waseda Univ., Japan)

Publications (Information Science)

Book chapter

[B1] G. Kim, K. Nakajima, T. Tatekawa, N. Teshima, Y. Suzuki, H. Takemiya
3D Virtual Plant Vibration Simulator on Simple Orchestration Application Framework
in "High Performance Computing on Vector Systems 2010"
(Springer, Heidelberg, 2010), 93-106

[B2] T. Tatekawa, K. Nakajima, G. Kim, N. Teshima, Y. Suzuki, H. Takemiya
Development of Simple Orchestration Application Framework and its application to burning plasma simulation
in "High Performance Computing on Vector Systems 2010"
(Springer, Heidelberg, 2010), 107-120

[B3] T. Tatekawa, N. Teshima, N. Kushida, H. Nakamura Miyamura, G. Kim, H. Takemiya
High Performance Computing for Analyzing PB-scale Data in Nuclear Experiments and Simulations
in "High Performance Computing on Vector Systems 2011"
(Springer, Heidelberg, 2011), 107-117

Refereed Journal

[1] T. Tatekawa, N. Teshima, Y. Suzuki, and H. Takemiya
Fault-tolerant Mechanism of both Job Execution and File Transfer for Integrated Nuclear Energy Simulation
Progress in Nuclear Science and Technology, Vol. 2, pp. 591-597 (2011)

[2] G. Kim, K. Nakajima, N. Teshima, T. Tatekawa, Y. Suzuki, and H. Takemiya
3D Virtual Simulator for the Entire Nuclear Power Plant on the Simple Orchestration Application Frameworkn
Progress in Nuclear Science and Technology, Vol. 2, pp. 634-638 (2011)

International Conference Proceedings

[P1] T. Tatekawa, K. Nakajima, N. Teshima, G. Kim, Y. Suzuki, H. Takemiya, N. Hayashi, and K. Iba
Simple Orchestration Application Framework to Control "Burning Plasma Integrated Code"
Proc. of The Third International Joint Conference on Computational Sciences and Optimization, Vol. 2, pp. 322-326 (May 28-31, 2010, Huangshan, China)

[P2] C. Kino, T. Tatekawa, N. Teshima, G. Kim, Y. Suzuki, F. Araya, A. Nishida, and H. Takemiya
Application Integration Control System for Multi-Scale and Multi-Physics Simulation
Joint International Conference on Supercomputing in Nuclear Applications + Monte Carlo 2010 (SNA+MC2010) (Oct 17-19, 2010, Tokyo, Japan)

[P3] Y. Suzuki, N. Kushida, T. Tatekawa, N. Teshima, Y. Caniou, R. Guivarch, M. Dayde, and P. Ramet
Development of an international matrix-solver prediction system on a French-Japanese international grid computing environment
Joint International Conference on Supercomputing in Nuclear Applications + Monte Carlo 2010 (SNA+MC2010) (Oct 17-19, 2010, Tokyo, Japan)

[P4] Y. Tsujita, T. Arima, T. Tatekawa, and Y. Suzuki
A portable grid-enabled computing system for a nuclear material study
Joint International Conference on Supercomputing in Nuclear Applications + Monte Carlo 2010 (SNA+MC2010) (Oct 17-19, 2010, Tokyo, Japan)

[P5] T. Tatekawa, Y. Urayama, Y. Iwasaki, S. Kishimoto, R. Komura, T. Miyoshi, K. Noguchi, Y. Sakamoto
Draft of Next Model Core Curriculum for Promotion of Information Security Education in KOSEN
14th International Symposium on Advances in Technology Education (ISATE 2021) (Aug 17-20, 2021, Online from Turku, Finland)

[P6] T. Miyoshi, R. Komura, Y. Urayama, Y. Iwasaki, T. Tatekawa, M. Maruyama, S. Kishimoto
Evaluation of Educational Content on Cybersecurity and Student's Skill Improvement by the Skill Check
14th International Symposium on Advances in Technology Education (ISATE 2021) (Aug 17-20, 2021, Online from Turku, Finland)

Invited Talk

[I1] T. Tatekawa, K. Nakajima, G. Kim, N. Teshima, Y. Suzuki, H. Takemiya
Development of Simple Orchestration Application Framework and its application to burning plasma simulation
11th Teraflop Workshop (Oct. 19-20, 2009, Tohoku Univ., Japan)

[I2] T. Tatekawa, N. Tshima, N. Kushida, H. Nakamura Miyamura, G. Kim, H. Takemiya
High Performance Computing for Analyzing PB-scale Data in Nuclear Experiments and Simulations
13th Teraflop Workshop (Oct. 21-22, 2010, Tohoku Univ., Japan)