

# Curriculum Vitae

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Date of birth: September 1951.

Nationality: Japanese

## Qualifications

1974 Bachelor of Engineering, Department of Applied Mathematics and Physics, Faculty of Engineering, Kyoto University.

1976 Master of Engineering, Department of Applied Mathematics and Physics, Graduate School of Engineering, Kyoto University.

1983 Degree of Ph.D., “Studies on the Interactions of Water Waves”, Kyoto University.

## Appointments

1976–1985 Research Associate, Research Institute for Applied Mechanics, Kyushu University.

1985–1988 Assistant Professor, Research Institute for Applied Mechanics, Kyushu University.

1988–1995 Associate Professor, Research Institute for Applied Mechanics, Kyushu University.

(1990–1991 Visiting Researcher in the University of Newcastle upon Tyne, UK)

1995–1996 Associate Professor, Department of Applied Mathematics and Physics, Faculty of Engineering, Kyoto University.

1996–1998 Professor, Department of Applied Mathematics and Physics, Graduate School of Engineering, Kyoto University.

1998– Professor, Department of Applied Analysis and Complex Dynamical Systems, Graduate School of Informatics, Kyoto University.

## Research Fields

Fluid Dynamics and Nonlinear Dynamics

Chaotic motion of fluids,  
Instabilities and bifurcations of fluid motion,  
Generation and interaction of water waves and internal waves,  
Chaotic mixing, chaotic motion of fluid particles,  
Vortex motion,  
Thermal convection,  
Complicated behavior of coupled nonlinear oscillators

### **External Recognition**

#### *Membership of professional bodies*

1976– Member, the Physical Society of Japan.

1976– Member, the Japan Society of Fluid Mechanics.

(2009– Fellow, the Japan Society of Fluid Mechanics.)

(2013 Vice President, the Japan Society of Fluid Mechanics.)

(2014 President, the Japan Society of Fluid Mechanics.)

1987– Member, The Visualization Society of Japan

1990– Member, The Japan Society for Industrial and Applied Mathematics

1999– Member, American Physical Society.

#### *Editorial*

1998–2004 Associate editor for Fluid Dynamics Research.

2009–2014 Editor-in-chief for Fluid Dynamics Research.

## Publications

### Papers in journals

- Y. Fukazawa and M. Funakoshi, “Onset of thermal convection and its flow patterns in a rectangular cavity”, *Fluid Dynamics Research*, Vol.47, No.6, 065505(33 pages), (2015)
- A. Hiramitsu and M. Funakoshi, “Surface waves in a square container due to its resonant horizontal elliptic motion”, *Fluid Dynamics Research*, Vol.47, No.4, 045504(25 pages), (2015)
- M. Funakoshi and B. Jang, “Chaotic Mixing by a Flow in a Curved Pipe”, *Procedia IUTAM*, Vol. 5, pp.169-172, (2012)
- Y. Fukazawa and M. Funakoshi, “Onset of three-dimensional thermal convection in an inclined rectangular cavity”, *Theoretical and Applied Mechanics Japan*, Vol.60, pp.163-174, (2011)
- B. Jang and M. Funakoshi, “Chaotic mixing in a helix-like pipe with periodic variations in curvature and torsion”, *Fluid Dynamics Research*, Vol.42, No.3, 035506(24 pages), (2010)
- M. Sano and M. Funakoshi, “Nonlinear Time Evolution of a Two-Layer Cylindrical Liquid Sheet”, *Journal of the Physical Society of Japan*, Vol.79, No.3, 034401(15 pages), (2010)
- Y. Fukazawa and M. Funakoshi, “Two-Dimensional Thermal Convection in a Parallelogram-Shaped Cavity with Inclined Sidewalls”, *Journal of the Physical Society of Japan*, Vol.78, No.6, 064401(19 pages), (2009)
- M. Sano and M. Funakoshi, “Linear Temporal Instability of a Two-Layer Axisymmetric Cylindrical Liquid Sheet”, *Journal of the Physical Society of Japan*, Vol.77, No.4, 044401(15 pages), (2008)
- M. Funakoshi, “Chaotic Mixing and Mixing Efficiency in a Short Time”, *Fluid Dynamics Research*, Vol.40, No.1, pp.1-33, (2008)
- Y. Mizuno and M. Funakoshi, “Reynolds-number dependence of fluid mixing in a spatially periodic three-dimensional steady flow”, *Progress of Theoretical Physics Supplement*, No.161, pp.278-281, (2006)
- Y. Mizuno and M. Funakoshi, “Reynolds number dependences of velocity field and fluid mixing in partitioned-pipe mixer”, *Journal of the Physical Society of Japan*, Vol.74, No.5, pp.1479-1489, (2005)

- Y. Mizuno and M. Funakoshi, “Chaotic mixing caused by an axially periodic steady flow in a partitioned-pipe mixer”, *Fluid Dynamics Research*, Vol.35, No.3, pp.205-227, (2004)
- Y. Mizuno and M. Funakoshi, “Chaotic Mixing Due to a Spatially Periodic Three-Dimensional Flow”, *Fluid Dynamics Research*, Vol.31, No.2, pp.129-149, (2002)
- M. Funakoshi, “Lagrangian Chaos and Mixing of Fluids”, *Japan Journal of Industrial and Applied Mathematics*, Vol.18, No.2, pp.613-626, (2001)
- K. Yoshimatsu and M. Funakoshi, “Surface Waves in a Square Container Due to Resonant Horizontal Oscillations”, *Journal of the Physical Society of Japan*, Vol.70, No.2, pp.394-406, (2001)
- K. Yoshimatsu and M. Funakoshi, “Third-Harmonic Resonance in Two-Dimensional Faraday Waves”, *Journal of the Physical Society of Japan*, Vol.69, No.8, pp.2468-2478, (2000)
- Y. Ohsugi and M. Funakoshi, “Generation of Long Waves in a Fluid Flowing over a Localized Topography at a Periodically Varying Velocity”, *Fluid Dynamics Research*, Vol.26, No.5, pp.289-304, (2000)
- A. Kawakami and M. Funakoshi, “Chaotic Motion of Fluid Particles around a Rotating Elliptic Vortex in a Linear Shear Flow”, *Fluid Dynamics Research*, Vol.25, pp.167-193, (1999)
- K. Yoshimatsu and M. Funakoshi, “Primary Patterns in Faraday Surface Waves at High Aspect Ratio”, *Journal of the Physical Society of Japan*, Vol. 67, No.2, pp.451-461, (1998)
- M. Funakoshi, “Interaction and Generation of Waves in a Two-Layer Fluid Flowing over Localized Bottom Topography”, *Dynamics of Atmospheres and Oceans*, Vol.23, Nos.1-4, pp.267-277, (1996)
- T. Atobe, M. Funakoshi, S. Inoue, “Orbital Instability and Chaos in the Stokes Flow between Two Eccentric Cylinders”, *Fluid Dynamics Research*, Vol.16, Nos.2-3, pp.115-129, (1995)
- M. Funakoshi, “Evolution of Vorticity Regions of Karman-Vortex-Street Type”, *Fluid Dynamics Research*, Vol.15, No.4, pp.251-269, (1995)
- T. Karasudani, M. Funakoshi, “Evolution of a Vortex Street in the Far Wake of a Cylinder”, *Fluid Dynamics Research*, Vol.14, No.6, pp.331-352, (1994)
- T. Atobe and M. Funakoshi, “Chaotic Motion of Fluid Particles Due to the Alternate Rotations of Two Eccentric Cylinders”, *Journal of the Physical Society of Japan*, Vol.63, No.5, pp.1738-1753, (1994)

- M. Funakoshi, “Steady Trapped Solutions to Forced Long-Short Interaction Equation”, *Journal of the Physical Society of Japan*, Vol.62, No.6, pp.1993-2006, (1993)
- M. Funakoshi and S. Inoue, “Stable Periodic Orbits of Equations for Resonantly Forced Water Waves”, *Journal of the Physical Society of Japan*, Vol.61, No.9, pp.3411-3412, (1992)
- M. Funakoshi and S. Inoue, “Bifurcations of Limit Cycles in Surface Waves due to Resonant Forcing”, *Fluid Dynamics Research*, Vol.5, No.4, pp.255-271, (1990)
- M. Funakoshi, S. Inoue, “Bifurcations in Resonantly Forced Water Waves”, *European Journal of Mechanics B/Fluids*, Vol.10, No.2, Supplement, pp.31-36, (1991).
- M. Oikawa, M. Okamura, M. Funakoshi, “Two-Dimensional Resonant Interaction between Long and Short Waves”, *Journal of the Physical Society of Japan*, Vol.58, No.12, pp.4416-4430, (1989)
- M. Oikawa, T. Karasudani, M. Funakoshi, “Stability of Flow between Eccentric Rotating Cylinders”, *Journal of the Physical Society of Japan*, Vol.58, No.7, pp.2355-2364, (1989)
- M. Oikawa, T. Karasudani and M. Funakoshi, “Stability of Flow between Eccentric Rotating Cylinders with a Wide Gap”, *Journal of the Physical Society of Japan*, Vol.58, No.6, pp.2209-2210, (1989)
- T. Karasudani, M. Funakoshi and M. Oikawa, “Breakdown and Rearrangement of Vortex Streets in a Far Wake”, *Journal of the Physical Society of Japan*, Vol.58, No.5, pp.1497-1500, (1989)
- M. Funakoshi and S. Inoue, “Chaotic Behaviour of Resonantly Forced Surface Water Waves”, *Physics Letters A*, Vol.121, No.5, pp.229-232, (1987)
- M. Funakoshi and M. Oikawa, “Long Internal Waves of Large Amplitude in a Two-Layer Fluid”, *Journal of the Physical Society of Japan*, Vol.55, No.1, pp.128-144, (1986)
- M. Funakoshi and M. Oikawa, “Long Internal Waves in a Two-Layer Fluid”, *Journal of the Physical Society of Japan*, Vol.54, No.7, pp.2470-2476, (1985)
- M. Funakoshi and M. Oikawa, “The Resonant Interaction between a Long Internal Gravity Wave and a Surface Gravity Wave Packet”, *Journal of the Physical Society of Japan*, Vol.52, No.6, pp.1982-1995, (1983)
- M. Funakoshi and M. Oikawa, “A Numerical Study on the Reflection of a Solitary Wave in Shallow Water”, *Journal of the Physical Society of Japan*, Vol.51, No.3, pp.1018-1023, (1982)

- M. Funakoshi and M. Oikawa, “The Resonant Interaction between a Long Internal Gravity Wave and a Surface Gravity Wave Packet”, Reports of Research Institute for Applied Mechanics, Kyushu University, Vol.29, No.93, pp.207-219, (1982)
- M. Funakoshi, “On the Time Evolution of a Solitary Wave Reflected by an Oblique Wall”, Reports of Research Institute for Applied Mechanics, Kyushu University, Vol.29, No.91, pp.79-93, (1981)
- M. Funakoshi, “Reflection of Obliquely Incident Solitary Waves”, Journal of the Physical Society of Japan, Vol.49, No.6, pp.2371-2379, (1980)

### Book

- M. Funakoshi and S. Inoue, “Bifurcations and Chaos in Resonantly Forced Water Waves”, in “Nonlinear Dispersive Wave Systems” (ed. L. Debnath, World Scientific), Chapter 35, pp.635-666, (1992)

### Papers in Proceedings

- M. Funakoshi and Y. Ohsugi, “Generation of Long Internal Waves in a Fluid Flowing over a Localized Topography at a Periodically Varying Velocity”, Proc. of the 5th International Symposium on Stratified Flows, Vol.2, pp.755-760, (2000)
- M. Funakoshi, R. Higuchi and M. Yamanaka, “Chaos and Domain Formation in an Inhomogeneous Coupled Map Lattice”, Proc. of the 3rd International Conference on Nonlinear Mechanics, pp.650-653, (1998)

### Invited lectures

- “Nonlinear water waves due to the resonant motions of a container”, Mini-Workshop on Nonlinear Waves in Fluids, (Kyoto, Japan, May, 2016).
- “Chaotic mixing and the estimation of its efficiency”, International Conference on Dynamics and Statistics of Coherent Structure in Turbulence: Roles of Elementary Vortices, (Tokyo, Japan, October, 2002).
- “Generation of Long Waves in a Fluid Flowing over a Localized Topography at a Periodically Varying Velocity”, Australian Mathematical Society, 43rd Annual Conference; Joint Meeting with the American Mathematical Society (Melbourne, Australia, 1999),
- “Motion of Fluid Particles around a Rotating Elliptic Vortex in a Linear Shear Flow”, International Workshop on Vortex Dynamics in Geophysical Flows (Castro Marina, Italy, 1998),
- 4th Tsukuba International Workshop on Chaos/Turbulence (Tsukuba, Japan, 1996),

- 3rd Tsukuba International Workshop on Chaos/Turbulence (Tsukuba, Japan, 1993),

### **Presentations in international conferences (since 1998)**

- M. Funakoshi and A. Hiramitsu; Surface waves in a square container due to its resonant horizontal elliptic motion, “3rd International Conference on Violent Flows”, (Osaka, Japan, March 9-11, 2016)
- M. Funakoshi and A. Hiramitsu; Surface waves in a square container due to its resonant horizontal elliptic motion, “68th Annual Meeting of the APS Division of Fluid Dynamics”, (Boston, Massachusetts, November 22-24, 2015)
- M. Funakoshi and Y. Fukazawa; Onset of three-dimensional thermal convection in an inclined rectangular or cubic cavity, “23rd International Congress of Theoretical and Applied Mechanics”, (Beijing, China, August 19 - 24, 2012)
- M. Funakoshi and B. Jang; Chaotic Mixing by a Flow in a Curved Pipe, “IUTAM Symposium on 50 Years of Chaos: Applied and Theoretical”, (Kyoto, Japan, November 28 - December 2, 2011)
- M. Funakoshi and Y. Fukazawa; Onset of Three-Dimensional Thermal Convection in a Rectangular Cavity, “64th Annual Meeting of the APS Division of Fluid Dynamics”, (Baltimore, Maryland, November 20-22, 2011)
- M. Funakoshi and K. Tamura; Faraday Waves in a Two-Layer Fluid in a Long Container, “Wave Phenomena IV”, (Edmonton, Canada, June 14-18, 2010)
- M. Funakoshi and B. Jang; Chaotic mixing in a curved pipe with periodic variations in curvature and torsion, “61st Annual Meeting of the APS Division of Fluid Dynamics”, (San Antonio, Texas, November, 2008)
- M. Funakoshi and B. Jang; Chaotic mixing in a helix-like pipe with periodic variations in curvature and torsion, “22nd International Congress of Theoretical and Applied Mechanics”, (Adelaide, Australia, August, 2008)
- Y. Fukazawa and M. Funakoshi; Two-Dimensional Thermal Convection in a Parallelogram-Shaped Cavity with Tilted Sidewalls, “22nd International Congress of Theoretical and Applied Mechanics”, (Adelaide, Australia, August, 2008)
- B. Jang and M. Funakoshi; Chaotic mixing in a helix-like pipe with a periodic modulation in curvature and torsion, “60th Annual Meeting of the APS Division of Fluid Dynamics”, (Salt Lake City, Utah, November, 2007)
- M. Funakoshi; Estimation of the Efficiency of Chaotic Mixing in a Few Periods, “The Kyoto-Birmingham University International Symposium on Recent Advances in Fluid Mechanics” (University of Birmingham, Birmingham, UK, September, 2006)

- M. Sano and M. Funakoshi; Analysis of the nonlinear time evolution of liquid sheets using a thin-layer approximation, “The Kyoto-Birmingham University International Symposium on Recent Advances in Fluid Mechanics” (University of Birmingham, Birmingham, UK, September, 2006)
- Y. Mizuno and M. Funakoshi; Reynolds-number dependence of transport barriers in chaotic mixing, “International symposium on fluid motions and chaos” (Kyoto University, Kyoto, February, 2006)
- Y. Mizuno and M. Funakoshi; Reynolds number dependence of fluid mixing in the partitioned-pipe mixer, “57th Annual Meeting of the APS Division of Fluid Dynamics” (Seattle, Washington, November, 2004)
- M. Funakoshi and H. Kawazoe; Relation between Mixing Efficiency and Geometrical Property of Stable Manifolds, “the 21st International Congress of Theoretical and Applied Mechanics” (Warsaw, Poland, August, 2004)
- Y. Mizuno and M. Funakoshi; Mixing process in a spatially periodic three-dimensional flow, “International Symposium on Nonlinear Analysis on Chaotic Mixing, Flow Instability and Turbulent Motion of Fluids”, (Kyoto University, Kyoto, March, 2004).
- M. Funakoshi and H. Kawazoe ; Chaotic mixing and deformation of fluid elements in a short time, “International Symposium on Nonlinear Analysis on Chaotic Mixing, Flow Instability and Turbulent Motion of Fluids”, (Kyoto University, Kyoto, March, 2004).
- Y. Mizuno and M. Funakoshi; Mixing Process within a Spatially Periodic Three-Dimensional Flow, “56th Annual Meeting of the APS Division of Fluid Dynamics”, (East Rutherford, New Jersey, November, 2003).
- M. Funakoshi and T. Nomoto; Stability of the Steady Configurations of a Central Vortex and a Few Satellite Vortices, “56th Annual Meeting of the APS Division of Fluid Dynamics”, (East Rutherford, New Jersey, November, 2003).
- M. Sano and M. Funakoshi; The thin-layer approximation analysis of a two-layer liquid sheet, “56th Annual Meeting of the APS Division of Fluid Dynamics”, (East Rutherford, New Jersey, November, 2003).
- M. Funakoshi and Y. Fukuda ; Steady Configuration of a Central Vortex and a Few Satellite Vortices of Uniform Vorticity, “55th Annual Meeting of the APS Division of Fluid Dynamics”, (Dallas, Texas, November, 2002).
- Y. Mizuno and M. Funakoshi ; A Numerical Study of Chaotic Mixing Due to a Spatially Periodic Three-Dimensional Flow, “55th Annual Meeting of the APS Division of Fluid Dynamics”, (Dallas, Texas, November, 2002).



- M. Funakoshi and Y. Fukuda; Steady configuration of a central vortex and a few satellite vortices of uniform vorticity; Conference on “Modeling, Simulation, and Experiments in Vortex Dynamics”, (Kyoto, October, 2002)
- M. Funakoshi and H. Nomura; Wave Patterns Generated by a Moving Pressure Disturbance in a Channel; “Wave Phenomena III”, (Edmonton, Canada, June 2001)
- M. Funakoshi and Y. Ohsugi; Generation of Long Internal Waves in a Fluid Flowing over a Localized Topography at a Periodically Varying Velocity; “5th International Symposium on Stratified Flows”, (Vancouver, Canada, July 2000)
- M. Funakoshi; Generation of Long Waves in a Fluid Flowing over a Localized Topography at a Periodically Varying Velocity; “Symposium on Singularities Arising in Flows and Waves”, (Kyoto, Japan, February 2000)
- M. Funakoshi, R. Higuchi and M. Yamanaka; Chaos and Domain Formation in an Inhomogeneous Coupled Map Lattice; “3rd International Conference on Nonlinear Mechanics”, (Shanghai, China, August 1998).

### **Seminars in universities outside Japan**

University of Newcastle upon Tyne, UK

University of St. Andrews, UK

Birmingham University, UK

Oxford University, UK

Bristol University, UK

University of Tuebingen, Germany

The University of Sheffield, UK

University of Exeter, UK