

RESUME

NAME:

Takashi Hibiki

WORK ADDRESS:

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EDUCATION:

Ph.D., Chemical Engineering, Osaka University (1990)
M.E., Chemical Engineering, Osaka University (1987)
B.E., Chemical Engineering, Osaka University (1985) (Highest Distinction)

PRESENT POSITION:

Professor Emeritus
School of Nuclear Engineering, Purdue University

PROFESSIONAL EXPERIENCE:

2017-present Guest Professor of College of Engineering, Xi'an Jiaotong University
2015-2017 Associate Head, School of Nuclear Engineering
2015 Acting Head, School of Nuclear Engineering
2013-2015 Associate Head, School of Nuclear Engineering
2012-2013 Associate Director, USNRC Institute of Thermal-Hydraulics
2009-2016 Associate Director, Mitsubishi Center of Thermal-Hydraulics
2008-present Adjunct Professor of College of Engineering, RMIT University
2006-present Invited Professor of Faculty of Engineering Science, Osaka University
2006-2018 Professor, School of Nuclear Engineering, Purdue University
1) Teaching thermal-hydraulics and reactor safety
2) Research in two-phase flow, heat transfer and reactor safety
- Measurement of Local Interfacial Area
- Modeling of Interfacial Area Transport

- Subcooled Boiling Study for Boiling Water Reactor
- Modeling Interfacial Transfer
- Modeling of Microgravity Flow
- Modeling and Measurement of Mini Channel Flow
- SBWR Integral Test Project (PUMA Project)
- Computational Fluid Dynamics

3) University Senate

4) Principle Investigator for Use of Radioactive Material and Radiation Producing Devices

2001-2003 Adjunct Associate Professor of Graduate School of Engineering Science, Osaka University

1) Teaching energy and environmental science

2001-2002 Visiting Associate Professor of School of Nuclear Engineering, Purdue University

1) Research

- Measurement of Local Interfacial Area of Subcooled Boiling Flow
- Modeling of Interfacial Area Transport
- Interpretation of Interfacial Area Transport of Downward Flows
- Development of Drift-Flux Model at Microgravity

2000 Visiting Scientist, School of Nuclear Engineering at Purdue University

1) Research

- Modeling of Interfacial Area Concentration
- Developing Drift-Flux Model for a Large Diameter Pipe

1998-1999 Adjunct Associate Professor of Institute of Materials Structure Science at High Energy Accelerator Research Organization

1) Research

- Thermal-Hydraulic Design of N-Arena Solid-Target System in JHF Project

1997-2006 Associate Professor of Research Reactor Institute at Kyoto University

Adjunct Associate Professor of Graduate School of Energy Science at Kyoto University

1) Teaching energy transport

2) Research

- Modeling and Experimental Study of Two-phase Flow
- Subcooled Boiling Study Using Neutron Radiography
- Development of Real-Time Fast Neutron Radiography

3) Research reactor operation and maintenance

- 1996-1997** Visiting Scientist, School of Nuclear Engineering at Purdue University
- 1) Research
 - Measurement of Local Interfacial Area
 - Development of Measuring Techniques to Local
 - Two-Phase Flow Measurements
 - Modeling of Interfacial Area Transport
- 1990-1997** Instructor of Research Reactor Institute at Kyoto University
- 1) Teaching experimental training
 - 2) Research
 - Development of High-Frame-Rate Thermal Neutron Radiography System
 - Development of Scattering Neutron Correction Method in NR Images
 - Measurement of Two-Phase Flow in Micro-Channels
 - Modeling Flow Regime Transition in Micro-Channels
 - Critical Heat Flux under Oscillatory Flow Conditions
 - Measurement of Critical Heat Flux
 - 3) Research reactor operation and maintenance
- 1987-1990** Ph. D. student of Department of Chemical Engineering at Osaka University
- 1) Research
 - Jet Breakup Study
 - Modeling Droplet Size from Jets in Electric Fields
 - Measurement of Droplet Size from Jets in Electric Fields

TEACHING EXPERIENCE:

- 2017-present Guest Professor of College of Engineering, Xi'an Jiaotong University
- 2006-2018 Professor of School of Nuclear Engineering at Purdue University
- 2008-present Adjunct Professor of College of Engineering, RMIT University
- 2006-present Invited Professor of Graduate School of Engineering Science, Osaka University
- 2001-2003 Adjunct Associate Professor of Graduate School of Engineering Science, Osaka University
- 2001-2002 Visiting Associate Professor of School of Nuclear Engineering, Purdue University
- 1997-1998 Adjunct Associate Professor of Institute of Materials Structure Science at High Energy Accelerator Research Organization
- 1997-2006 Associate Professor of Research Reactor Institute, Kyoto University
- 1990-1997 Instructor of Research Reactor Institute, Kyoto University

PROFESSIONAL SOCIETIES:

Fellow, American Nuclear Society
Member, Atomic Energy Society of Japan
Member, The Japan Society of Mechanical Engineers
Member, The Society of Chemical Engineers, Japan
Member, The Japanese Society for Multiphase Flow
Member, The Heat Transfer Society of Japan

PROFESSIONAL COMMITTEE PARTICIPATION

- Paper Review Committee, Japan Atomic Energy Society of Japan, 1995
- Governing Board, Power and Energy System Division, The Japan Society of Mechanical Engineers, 1998-2000
- Planning Committee, Thermal-Hydraulics Division, Atomic Energy Society of Japan, 1998
- Exploratory Committee, R & D of Improvement of Thermal-Hydraulic Analysis Methods in Nuclear Reactors, Japan Space Utilization Promotion Center, 1998
- Research Committee, Application of Photocatalysis to Fluid Engineering, Japan Space Utilization Promotion Center, 1999
- Research Planning Committee, Nuclear Engineering Laboratory, University of Tokyo, 1999
- Higher Education Committee, Educational Division, The Society of Chemical Engineering, Japan, 1999-2001
- R & D Committee, R & D of Radiation Detector, Japan Space Utilization Promotion Center, 2000
- Research Committee, Improvement of Boiling Performance Using Radiation Induced Surface Activity, Power and Energy System Division, The Japan Society of Mechanical Engineers, 2001
- International Advisory Committee, Plutonium Futures-The Science 2003, 4-Day Topical Conference on Plutonium and Actinides, Los Alamos National Laboratory, July 6-10, 2003
- Scientific Committee, 5th International Conference on Multiphase Flows, Yokohama, Japan, May 30-June 4, 2004
- Technical Program Committee, 11th International Topical Meeting on Nuclear Reactor Thermal Hydraulics, Avignon, France, October 2-6, 2005
- Reviewers Committee, Nuclear Engineering and Technology, 2004
- Editorial Board, Nuclear Engineering and Technology, 2006
- Session Organizer, 15th International Conference on Nuclear Engineering, Nagoya, Japan, April 22-25, 2007

- Session Organizer, 13th International Topical Meeting on Nuclear Reactor Thermal Hydraulics, Kanazawa, Japan, October 2-6, 2009.
- Editorial Board, Journal of Computational Multiphase Flow, 2009
- Editorial Board, International Journal of Microscale and Nanoscale Thermal and Fluid Transport Phenomena, 2010
- Session Organizer, International Conference of PM2.5 & Energy Security 2014, March 5-7, 2014, Kyoto, Japan.
- Session Organizer, 16th International Conference on Nuclear Engineering, Chicago, Japan, August 30-September 4, 2015
- Editorial Board, Experimental and Computational Multiphase Flow, 2018

CURRENT RESEARCH INTERESTS:

- Basic two-phase flow experiments and modeling
- Interfacial area transport equation development
- Development of neutron radiography system
- Thermal-hydraulic research at micro-gravity conditions
- Critical heat flux and heat transfer in mini channels
- Two-phase flow in micro and mini channels
- Drift-flux model development in various channels
- Subcooled boiling experiments and modeling
- Flow-induced vibration analysis
- LWR safety analysis
- Research reactor utilization for industrial purposes

AWARDS AND HONORS:

- 2019 Preeminent Monograph Award, The Japan Institute of Marine Engineering for Experimental study of two-phase flow structure and drag reduction in horizontal rectangular channel
- 2019 Preeminent Monograph Award, Atomic Energy Society of Japan for modeling of distribution parameter, void fraction covariance and relative velocity covariance for upward steam-water boiling flow in vertical rod bundle
- 2018 Preeminent Monograph Award, Japanese Society for Multiphase Flow for fundamental research of gas-liquid two-phase flow in large diameter channels
- 2017 Outstanding Engineering Graduate Student Mentor Award, Nuclear Engineering Graduate Organization, School of Nuclear Engineering, Purdue

University

- 2016 Award for Eminent Achievements in Nuclear Science and Technology in recognition of extensive and outstanding original research contributions to nuclear thermal-hydraulics, instrumentation methods and modeling of two-phase flow
- 2015 JSME Best Paper Award for “Study of unsteady gas-liquid two-phase flow induced force fluctuation”, The Japan Society of Mechanical Engineers
- 2015 Osaka University Global Alumni Fellow, Osaka University, Japan
- 2012 Best Teacher Award, School of Nuclear Engineering, Purdue University
- 2011 Elected American Nuclear Society Fellow
- 2011 Distinguished Service Award, Heat Transfer Society of Japan
- 2010 Preeminent Monograph Award, Japanese Society for Multiphase Flow for Measurement and Modeling of Two-Phase Flow at Microgravity Conditions,
- 2007 Engineering Achievement Award, Thermal-hydraulics Division, Atomic Energy Society of Japan in recognition of extensive and outstanding original research contributions to nuclear thermal-hydraulics and modeling of two-phase flow,
- 2005 Research & Development Award, Japanese Society for Multiphase Flow for Development of Advanced Neutron Radiography Technique,
- 2001 Young Member Engineering Achievement Award, American Nuclear Society in recognition of extensive and outstanding original research contributions to nuclear thermal-hydraulics, instrumentation methods and modeling of two-phase flow,
- 2001 Preeminent Monograph Award, Japanese Society for Multiphase Flow for Development of Interfacial Area Transport Equation in Bubbly Flow Systems,
- 2001 Certificate of Merit for Outstanding Presentation from Japan Society of Mechanical Engineers for Interfacial Area Concentration in Steady Fully-Developed Bubbly Flow presented in the 9th International Conference on Nuclear Engineering held at Nice in France in 2001,
- 1995 Promising Endeavor Award, Atomic Energy Society of Japan for Visualization and Measurement of Thermal and Fluid Phenomena Using Neutrons as Microscopic Probes,
- 1984 Kusumoto Award, Osaka University for Highest Distinction,

PUBLICATIONS:

A. Ph. D. Thesis

1. T. Hibiki, “Study on Formation of Single Drops from a Laminar Jet in Electric Fields”, Osaka University, Japan (1990).

B. Books and Book Chapter

1. K. Mishima, and T. Hibiki, “Measurement of Interfacial Area Concentration Using a Probe Method,” *Advanced Measurement in Multiphase Flow*, pp.84-92, Morikita Publishing Company, Tokyo, Japan (2003).
2. M. Ishii, and T. Hibiki, “Thermo-fluid Dynamics of Two-phase Flow,” Springer Verlag (2005).
3. J. E. Julia, T. Hibiki, M. Ishii, “Two-Phase Flow Regime Identification Methodologies in Thermal-Hydraulic Applications,” *Advances in Multiphase Flow and Heat Transfer (Volume 1)*, pp.93-113, Bentham Science Publishers Ltd. (2010).
4. M. Ishii, and T. Hibiki, “Thermo-fluid Dynamics of Two-phase Flow,” 2nd Edition, Springer Verlag (2010).
5. X. Shen, J. Schlegel, S. W. Chen, S. Rassame, M. J. Griffiths, T. Hibiki and M. Ishii, “Flow Characteristics and Void Fraction Prediction in Large Diameter Pipes,” *Frontiers and Progress in Multiphase Flow*, Springer, Chapter 2 (2014) pp.55-103.

C. Journal Publications

1. T. Hibiki, M. Yamaguchi, and T. Katayama, “Formation of Single Charged Drops from a Laminar Water Jet in a Uniform Electric Field,” *Kagaku Kogaku Ronbunshu*, vol.14, pp.476-482 (1988).
2. T. Hibiki, M. Yamaguchi, and T. Katayama, “Stability of a Dielectric Liquid Jet in a Nonuniform Electric Field,” *Kagaku Kogaku Ronbunshu*, vol.15, pp.269-275 (1989).
3. T. Hibiki, M. Yamaguchi, and T. Katayama, “Formation of Single Charged Drops from a Laminar Liquid Jet in a Nonuniform Electric Field and Dynamic Behavior of the Jet,” *Kagaku Kogaku Ronbunshu*, vol.15, pp.1153-1159 (1989).
4. T. Hibiki, M. Yamaguchi, and T. Katayama, “Formation of Single Charged Drops from a Dielectric Liquid Jet in a Nonuniform Electric Field -Theoretical Analysis on Liquid Jet in the Center of a Cylindrical Electrode-,” *Kagaku Kogaku Ronbunshu*, vol.16, pp.694-699 (1990).

5. T. Hibiki, M. Yamaguchi, and T. Katayama, "Formation of Single Charged Drops from a Dielectric Liquid Jet in a Nonuniform Electric Field -Experiment on Liquid Jet in the Center of a Cylindrical Electrode-," *Kagaku Kogaku Ronbunshu*, vol.16, pp.700-705 (1990).
6. T. Hibiki, M. Yamaguchi, and T. Katayama, "Formation of Single Charged Droplets from a Laminar Liquid Jet in a Uniform Electric Field," *International Chemical Engineering*, vol.30, pp.300-307 (1990).
7. T. Hibiki, M. Yamaguchi, and T. Katayama, "Effect of Flow Rate and Electric Field on Transition from Undeveloped Liquid Jet to Laminar Liquid Jet," *Kagaku Kogaku Ronbunshu*, vol.18, pp.87-93 (1992).
8. T. Hibiki, M. Yamaguchi, and T. Katayama, "Prediction of Breakup Length of Laminar Liquid Jets in Electric Fields," *Kagaku Kogaku Ronbunshu*, vol.19, pp.963-970 (1993).
9. K. Mishima, T. Hibiki, and H. Nishihara, "Some Characteristics of Gas-Liquid Flow in Narrow Rectangular Ducts," *International Journal of Multiphase Flow*, vol.19, pp.115-124 (1993).
10. T. Hibiki, K. Mishima, K. Yoneda, S. Fujine, K. Kanda, H. Nishihara, A. Tsuruno, and M. Matsubayashi, "Application of Neutron Radiography to Visualization and Void Fraction Measurement of Air-Water Two-Phase Flow in a Small Diameter Tube," *Journal of Nuclear Science and Technology*, vol.30, pp.516-523 (1993).
11. T. Hibiki, K. Mishima, K. Yoneda, S. Fujine, A. Tsuruno, and M. Matsubayashi, "Visualization of Fluid Phenomena Using a High Frame-Rate Neutron Radiography with a Steady Thermal Neutron Beam," *Nuclear Instruments and Methods in Physics Research*, vol.A351, pp.423-436 (1994).
12. H. Umekawa, M. Ozawa, A. Miyazaki, K. Mishima, and T. Hibiki, "Critical Heat Flux in Boiling Channel under Oscillatory Flow Condition," *Transactions of the Japan Society of Mechanical Engineers*, vol.61, pp.1048-1054 (1995).
13. K. Mishima, and T. Hibiki, "Effect of Inner Diameter on Some Characteristics of Air-Water Two-Phase Flows in Capillary Tubes," *Transactions of the Japan Society of Mechanical Engineers*, vol.61, pp.3197-3204 (1995).
14. K. Mishima, T. Hibiki, S. Fujine, K. Yoneda, A. Tsuruno, M. Matsubayashi, and M.

- Sobajima, "Visualization and Measurements of Two-Phase Flows in Metallic Ducts by Neutrons as Microscopic Probes (1st Report, Time-Resolved Neutron Radiography and Its Limited Time-Resolution)," *Transactions of the Japan Society of Mechanical Engineers*, vol.61, pp.3959-3966 (1995).
15. K. Mishima, T. Hibiki, and H. Nishihara, "Effect of Pressure on Critical Heat Flux for Water in an Internally Heated Annuli," *Nuclear Science Journal*, vol.32, pp.34-41 (1995).
 16. T. Hibiki, K. Mishima, and M. Matsubayashi, "Application of High Frame-Rate Neutron Radiography with a Steady Thermal Neutron Beam to Two-Phase Flow Measurements in a Metallic Rectangular Duct," *Nuclear Technology*, vol.110, pp.422-435 (1995).
 17. K. Mishima, and T. Hibiki, "Visualization and Measurements of Two-Phase Flows in Metallic Ducts by Neutrons as Microscopic Probes (2nd Report, Measurements of Some Flow Characteristics Using Image Processing Techniques)," *Transactions of the Japan Society of Mechanical Engineers*, vol.62, pp.137-144 (1996).
 18. T. Hibiki, and K. Mishima, "Visualization and Measurements of Two-Phase Flows in Metallic Ducts Using Neutrons as Microscopic Probes (3rd Report, Quantitative Method of Neutron Radiography Image)," *Transactions of the Japan Society of Mechanical Engineers*, vol.62, pp.919-926 (1996).
 19. T. Hibiki, and K. Mishima, "Visualization and Measurements of Two-Phase Flows in Metallic Ducts Using Neutrons as Microscopic Probes (4th Report, Effect of Image Gray-Scale and Pixel-Number on Image-Quantification)," *Transactions of the Japan Society of Mechanical Engineers*, vol.62, pp.1781-1787 (1996).
 20. T. Hibiki, and K. Mishima, "Visualization and Measurements of Two-Phase Flows in Metallic Ducts Using Neutrons as Microscopic Probes (5th Report, Radial Void Distribution Measurement Method of Two-Phase Flow in a Round Tube)," *Transactions of the Japan Society of Mechanical Engineers*, vol.62, pp.3002-3008 (1996).
 21. K. Mishima, and T. Hibiki, "Quantitative-Measurement Limits of Thermal and Fluid Phenomena Using Neutron Attenuation Characteristics in Materials," *International Journal of Experimental Heat Transfer, Thermodynamics, and Fluid Mechanics*,

Experimental Thermal and Fluid Science, vol.12, pp.461-472 (1996).

22. K. Mishima, and T. Hibiki, “Some Characteristics of Air-Water Two-Phase Flow in Small Diameter Tubes,” *International Journal of Multiphase Flow*, vol.22, pp.703-712 (1996).
23. H. Umekawa, M. Ozawa, A. Miyazaki, K. Mishima, and T. Hibiki, “Critical Heat Flux in Boiling Channel under Oscillatory Flow Condition,” *JSME International Journal*, vol.39, pp.412-418 (1996).
24. T. Hibiki, and K. Mishima, “Feasibility of High Frame-Rate Neutron Radiography by Using a Steady Thermal Neutron Beam with 10^6 n/(cm²·s) Flux,” *Nuclear Instruments and Methods in Physics Research*, vol.A369, pp.186-194 (1996).
25. T. Hibiki, and K. Mishima, “Approximate Method for Measurement of Phase-Distribution in Multiphase Materials with Small Neutron-Attenuation Using a Neutron Beam as a Probe,” *Nuclear Instruments and Methods in Physics Research*, vol.A374, pp.345-351 (1996).
26. K. Mishima, and T. Hibiki, “Quantitative Method to Measure Void Fraction of Two-Phase Flow Using Electronic Imaging with Neutrons,” *Nuclear Science and Engineering*, vol.124, pp.327-338 (1996).
27. T. Hibiki, K. Mishima, and H. Nishihara, “Influence of Scattered Neutrons on Void Fraction Measurement of Two-Phase Flow Using Real-Time Thermal Neutron Radiography,” *Journal of Nuclear Science and Technology* vol.34, pp.996-1005 (1997).
28. K. Mishima, T. Hibiki, and H. Nishihara, “Visualization and Measurement of Two-Phase Flow by Using Neutron Radiography,” *Nuclear Engineering and Design*, vol.175, pp.25-35 (1997).
29. T. Hibiki, and K. Mishima, “Prediction of Measurement Error Due to Low Gray-Scale and Spatial-Resolution of an Imaging System on Quantification of Neutron Radiographic Image, ” *Nuclear Instruments and Methods in Physics Research*, vol.A388, pp.204-211 (1997).
30. T. Hibiki, K. Mishima, and H. Nishihara, “Measurement of Radial Void Fraction Distribution of Two-Phase Flow in a Metallic Round Tube Using Neutrons as

- Microscopic Probes,” *Nuclear Instruments and Methods in Physics Research*, vol.A399, pp.432-438 (1997).
31. H. Umekawa, M. Ozawa, T. Mitsunaga, K. Mishima, T. Hibiki, and Y. Saito, “Scaling Parameter of CHF under Oscillatory Flow Condition”, *Transactions of the Japan Society of Mechanical Engineers*, vol.64, pp.161-166 (1998).
 32. K. Mishima, and T. Hibiki, “Development of High-Frame-Rate Neutron Radiography and Quantitative Measurement Method for Multiphase Flow Research,” *Nuclear Engineering and Design*, vol.184, pp.183-201 (1998).
 33. T. Hibiki, S. Hogsett, and M. Ishii, “Local Measurements of Interfacial Area, Interfacial Velocity and Liquid Turbulence in Two-Phase Flow,” *Nuclear Engineering and Design*, vol.184, pp.287-304 (1998).
 34. T. Hibiki, and M. Ishii, “Effect of Flow-Induced Vibration on Local Flow Parameters of Two-Phase Flow,” *Nuclear Engineering and Design*, vol.185, pp.113-125 (1998).
 35. J. T. Hsu, M. Ishii, and T. Hibiki, “Experimental Study on Two-Phase Natural Circulation and Flow Termination in a Loop,” *Nuclear Engineering and Design*, vol.186, pp.395-409 (1998).
 36. H. Unesaki, T. Hibiki, and K. Mishima, “Verification of Neutron Radiographic Measurement of Void Fraction by Monte Carlo Simulation,” *Nuclear Instruments and Methods in Physics Research*, vol.A405, pp.98-104 (1998).
 37. H. Unesaki, T. Hibiki, and K. Mishima, “Evaluation of Scattered Neutron Component in Thermal Neutron Radiography Image -Influence of Scattered Neutrons and Unparallelness of Incident Neutron Beam,” *Nuclear Instruments and Methods in Physics Research*, vol.A413, pp.143-150 (1998).
 38. H. Umekawa, M. Ozawa, T. Mitsunaga, K. Mishima, T. Hibiki, and Y. Saito, “Scaling Parameter of CHF Under Oscillatory Flow Conditions,” *Heat Transfer – Asian Research*, vol.28, pp.541-550 (1999).
 39. T. Hibiki, and M. Ishii, “Experimental Study on Interfacial Area Transport in Bubbly Two-Phase Flow,” *International Journal of Heat and Mass Transfer*, vol.42, pp.3019-3035 (1999).

40. K. Mishima, T. Hibiki, Y. Saito, J. Sugimoto, and K. Moriyama, "Visualization Study of Molten Metal-Water Interaction by Using Neutron Radiography," *Nuclear Engineering and Design*, vol.189, pp.391-403 (1999).
41. K. Mishima, T. Hibiki, Y. Saito, H. Nakamura, and M. Matsubayashi, "The Review of the Application of Neutron Radiography to Thermal Hydraulic Research," *Nuclear Instruments and Methods in Physics Research*, vol.A424, pp.66-72 (1999).
42. Y. Saito, K. Mishima, T. Hibiki, A. Yamamoto, J. Sugimoto, and K. Moriyama, "Application of High-Frame-Rate Neutron Radiography to Steam Explosion Research," *Nuclear Instruments and Methods in Physics Research*, vol.A424, pp.142-147 (1999).
43. K. Mishima, T. Hibiki, Y. Saito, H. Nishihara, Y. Tobita, K. Konishi, and M. Matsubayashi, "Visualization and Measurement of Gas-Liquid Metal Two-Phase Flow with Large Density Difference Using Thermal Neutrons as Microscopic Probes," *Nuclear Instruments and Methods in Physics Research*, vol.A424, pp.229-234 (1999).
44. H. Nakamura, Y. Sibamoto, Y. Anoda, Y. Kukita, K. Mishima, and T. Hibiki, "Visualization of Molten-Metal/Water Interaction Using High-Frame-Rate Neutron Radiography," *Nuclear Technology*, vol.125, pp.213-224 (1999).
45. T. Hibiki, and M. Ishii, "One-Group Interfacial Area Transport of Bubbly Flows in Vertical Round Tubes," *International Journal Heat and Mass Transfer*, vol. 43, pp. 2711-2726 (2000).
46. T. Hibiki, and M. Ishii, "Experimental Study on Hot-Leg U-bend Two-Phase Natural Circulation in a Loop with a Large Diameter Pipe," *Nuclear Engineering and Design*, vol.195, pp.69-84 (2000).
47. T. Hibiki, Y. Saito, K. Mishima, Y. Tobita, K. Konishi, and M. Matsubayashi, "Study on Flow Characteristics in Gas-Molten Metal Mixture Pool," *Nuclear Engineering and Design*, vol.196, pp.233-245 (2000).
48. T. Hibiki, and M. Ishii, "Two-Group Interfacial Area Transport Equations at Bubbly-to-Slug Flow Transition," *Nuclear Engineering and Design*, vol.202, pp.39-76 (2000).
49. M. Matsubayashi, H. Kobayashi, T. Hibiki, and K. Mishima, "Design and Characteristics of JRR-3M Thermal Neutron Radiography Facility and Its Imaging

- Systems,” *Nuclear Technology*, vol.132, pp.309-324 (2000).
50. S. Kakuno, T. Yamagishi, T. Hibiki, and T. Sekimoto, “An Analyses of Entrained Bubble Volume in the Breaker Zone Using the Void-Probe and the Effect of Reaeration,” *Annual Journal of Coastal Engineering*, vol. 48, pp.71-75 (2001).
 51. M. Kureta, T. Hibiki, K. Mishima, and H. Akimoto, “Measurement of Boiling Flow by High-Frame-Rate Neutron Radiography (1st Report, Error Estimation and Void Fraction Measurement),” *Transactions of the Japan Society of Mechanical Engineers*, vol.67, pp.179-188 (2001).
 52. M. Kureta, T. Hibiki, K. Mishima, and H. Akimoto, Measurement of Boiling Flow by High-Frame-Rate Neutron Radiography –2nd Report Point of Net Vapor Generation of Flow Boiling in Rectangular Channels with Short Heated Length,” *Transactions of the Japan Society of Mechanical Engineers Transfer*, vol. 67, pp.2295-2303 (2001).
 53. T. Hibiki, M. Ishii, and Z. Xiao, “Axial Interfacial Area Transport of Vertical Bubbly Flows,” *International Journal of Heat and Mass Transfer*, vol.44, pp.1869-1888 (2001).
 54. T. Hibiki, and M. Ishii, “Interfacial Area Concentration in Steady Fully Developed Bubbly Flow,” *International Journal of Heat and Mass Transfer*, vol.44, pp.3443-3461 (2001).
 55. T. Hibiki, T. Takamasa, and M. Ishii, “Interfacial Area Transport of Bubbly Flow in a Small Diameter Pipe,” *Journal of Nuclear Science and Technology*, vol. 38, pp.614-620 (2001).
 56. F. Tanaka, T. Hibiki, Y. Saito, T. Takeda, and K. Mishima, “Heat Transfer Study for Thermal-Hydraulic Design of the Solid-Target of Spallation Neutron Source”, *Journal of Nuclear Science and Technology*, vol. 38, pp.832-843 (2001).
 57. M. Matsubayashi, T. Hibiki, and K. Mishima, “Present Status on the Development of a High-Frame-Rate Neutron Radiography System in JRR-3M,” *Nondestructive Testing and Evaluation*, vol. 16, pp.267-275 (2001).
 58. T. Hibiki, and K. Mishima, “Flow Regime Transition Criteria for Upward Two-Phase Flow in Vertical Narrow Rectangular Channels,” *Nuclear Engineering and Design*, vol.203, pp.117-131 (2001).

59. T. Hibiki, and M. Ishii, "Effect of Inlet Geometry on Hot-Leg U-Bend Two-Phase Natural Circulation in a Loop with a Large Diameter Pipe," *Nuclear Engineering and Design*, vol.203, pp.209-228 (2001).
60. M. Matsubayashi, T. Hibiki, K. Mishima, K. Yoshii, and K. Okamoto, "Preliminary Examination of the Applicability of Imaging Plates to Fast Neutron Radiography," *Nuclear Instruments and Methods in Physics Research*, vol.463, pp.324-330 (2001).
61. M. Kureta, H. Akimoto, T. Hibiki, and K. Mishima, "Void Fraction Measurement in Subcooled-Boiling Flow Using High-Frame-Rate Neutron Radiography," *Nuclear Technology*, vol. 136, pp.241-254 (2001).
62. M. Ozawa, H. Umekawa, K. Mishima, and T. Hibiki, and Y. Saito, "CHF in Oscillatory Flow Boiling Channels", *Trans ICheE, Part A - Chemical Engineering Research and Design*, vol. 79, pp.389-401 (2001).
63. T. Hibiki, and M. Ishii, "Distribution Parameter and Drift Velocity of Drift-Flux Model in Bubbly Flow," *International Journal of Heat and Mass Transfer*, vol. 45, pp.707-721 (2002).
64. T. Hibiki, and M. Ishii, "Development of One-Group Interfacial Area Transport Equation in Bubbly Flow Systems," *International Journal of Heat and Mass Transfer*, vol.45, pp.2351-2372 (2002).
65. T. Hibiki, and M. Ishii, "Interfacial Area Concentration of Bubbly Flow Systems," *Chemical Engineering Science*, vol.57, pp.3967-3977 (2002).
66. S. Kakuno, T. Sekimoto, and T. Hibiki, "A Concept of "Gas Volume Rate Coefficient" for Evaluation of Air/Water Gas Transfer at the Breaker Zone," *Annual Journal of Coastal Engineering*, vol. 50, pp.106-110 (2003).
67. S. Kakuno, T. Suzuki, T. Sekimoto, and T. Hibiki, "Development of Double Void Probe for Measurement of Entrained Bubble Characteristics in the Breaker Zone and Verification of Its Applicability," *Annual Journal of Coastal Engineering*, vol. 50, pp.1405-1409 (2003).
68. T. Hibiki, H. Goda, S. Kim, M. Ishii, and J. Uhle, "Experimental Study on Interfacial Area Transport of Vertical Downward Bubbly Flow," *Experiments in Fluid*, vol.35,

pp.100-111 (2003).

69. T. Hibiki, R. Situ, Y. Mi, and M. Ishii, "Experimental Study on Interfacial Area Transport of Vertical Upward Bubbly Two-Phase Flow in an Annulus," *International Journal of Heat and Mass Transfer*, vol. 46, pp.427-441 (2003).
70. M. Kureta, T. Hibiki, K. Mishima, and H. Akimoto, "Study on the Point of Net Vapor Generation of Boiling Flow in Narrow Rectangular Channels with a Short Heated Length by Using Neutron Radiography," *International Journal of Heat and Mass Transfer*, vol.46, pp.1171-1181 (2003).
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