Curriculum Vitae for Yoshiyuki Tsuji

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Date of birth: 27 April 1963
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Education:

1984-1988 Faculty of Engineering, Nagoya university
Awarded the degree of BSc in mechanical engineering.
1988-1990 Department of Mechanical Engineering, Nagoya University,
Awarded the degree of MSc in mechanical engineering.
1990-1993 Department of Mechanical Engineering, Nagoya University,
Awarded the degree of PhD in mechanical engineering for a thesis entitled "Fractal feature of velocity field in turbulent boundary layers".

Research and professional experience:

1993 - 1999 Assistant professor at graduate school of engineering, Nagoya university
1999 - 2010 Associate professor at graduate school of engineering, Nagoya university
2010 - present Professor at graduate school of engineering, Nagoya university

1997 - 1998 Research associate at the department of mechanical engineering, Yale University (1 year and half)
2000 March-May Visiting researcher at the department of mechanical engineering, Yale University, Monbusyo Fellowship Program for Japanese Scholars and Researchers to Study Abroad (3 months)
2004 June-August Visiting researcher at the department of mechanics, Royal Institute of Technology, Sweden, Researcher Exchange Program, Japan Society for the Promotion of Science (3 months)

2004 - 2008 Fluid Dynamical Research, Associate Editor
2009 - 2022 JSME international journal of fluid mechanics, Associate Editor
2012 - 2013 Chairman of department of energy engineering and science
2013 - 2014 Member of a board of directors, Japan Society of Fluid Mechanics
2013 - 2014 Fellow of Japan Society of Fluid Mechanics
2014 - 2015 Vice-chairman of central branch of Japan Society of Fluid Mechanics
2015 - 2016 Chairman of central branch of Japan Society of Fluid Mechanics
2020 - 2023 Member of a board of directors, Japan Society of Fluid Mechanics

Teaching and supervision

Basic level courses: Mathematics, Mechanics, Statistical theory
Advanced and graduate level courses: Fluid mechanics, boundary layer theory, Turbulence, Thermal fluid mechanics
Supervisor for more than 75 Mater thesis.
Supervisor of 7 PhD degrees, at present supervisor of 5 PhD students.

International and national committee membership and commissions

*Organizer of Trans-Discipline and Innovation of approach to turbulent phenomena, Research Institute of applied mechanics, Kyusyu University, June 23-25, 2004
*Organizing committee of IUTAM Symposium on computational physics and new perspectives in turbulence, September 11-14, 2006
*Organizer of turbulent session in annual meeting of Japan society of fluid mechanics
*Organizing committee of 6th Japan-Korea Symposium on Nuclear Thermal Hydraulics and Safety, 2008
*Organizing committee of The 13th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-13), 2009
*Organizing committee of Visualization on New Perspectives in Quantum turbulence: experiments and numerical simulation, December 11-12, 2014.
*Organizer of The role of turbulent structures on statistical law and dynamics, Research Institute of applied mechanics, Kyusyu University, February 24-25, 2014.
*Organizing committee of International Symposium on Near-Wall Flows: Transition and Turbulence, June 20 – 22, Kyoto University, 2016.
*Organizing committee of International Symposium Flow Dynamics, Tohoku University, 2019-2023

Distinctions

1993 May, Japan Society of Mechanical Engineering, Young Engineers Award
2003 July, Japan Society for Fluid Mechanics, Ryumon Award
2017 March, Japan Society of Mechanical Engineers Medal for Outstanding Paper
2021 Nov., Japan Society for Fluid Mechanics, Chubu-branch Contribution Awards

Publications

More than 100 papers (published) in journals with referee system (citation 1807, h-index 22, h10 index 40, Google Scolor)

More than 50 papers in refereed conference proceedings

Research activity field

○***Wall bounded turbulent shear flow***

Universal mean velocity profiles and turbulent statistics are studied in High Reynolds number flow experimentally and in Direct numerical simulations. Especially the invariant probability density function of velocity fluctuations is revealed[11,16,20]. The most highest Re number in turbulent boundary layer[1], channel [3], and pipe flow [6,23] was achieved.

○***Small scale universality in turbulence***

How the local isotropic hypothesis in the inertial range [2] is studied under the effect of shear in velocity fluctuation[21], pressure fluctuations[4]. The intermittency effect of energy spectrum [17], Reynolds shear stress fluctuation [34] are quantified. Also the linear response theory is applied to investigate the local equilibrium state of inertial range[26,55,59].

○***Thermal convection in mercury***

The thermal convection of mercury in a confined cell is studied experimentally. The Ultrasonic velocity profile monitor is applied for the first time to measure the velocity at 128 points simultaneously. The flow pattern (called Mean wind) is studied depending on the aspect ratio of cylindrical cell [5,8,58]. Also the velocity and temperature fluctuation were measured simultaneously[40].

○***Experimental technique to measure statistical quantity in turbulence***

Pressure fluctuations in high Re number turbulent boundary layer was measured for the first time [1] and the pressure strain term was measured in the mixing layer[26]. Shear stress fluctuations were measured by the electrical chemical method[56,57,60] and the mean shear stress was measured by oil film and towing tank experiment[51]. The friction factor coefficient in heigh Re number was clarified. Stereo PIV, Tomo-PIV, and PTV methods were applied for the measurement of complex flow field [9,10,19,45] and the ultra sonic velocity profile monitor was applied to the wake of cylinder[29]. Laser doppler velocity profile meter with the correction of space resolution was applied to measure the high Re number pipe flow [6,23,65].

○***Free-surface instability over liquid jet***

Free surface instability over the liquid metal jet was studied experimentally [39,42]. The high frequency of optical measurement technique was developed, and the wave shape was reconstructed [7,13].

○***Quantum turbulence***

The flow of super fluid helium was studied using PIV measurement. The Lagrange property of small particle motions, such as velocity and acceleration [41,44] depends on particle sizes[63], and the curvature of Lagrange trajectories can separate the motions carried by normal and super fluid flow[64]. The Helium exima was uses as a tracer particles and they were excited by neutron [51]. It is a possibility to visualize the quantum vortex motion using Helium exima [61].

[1] Pressure statistics and their scaling in high-Reynolds-number turbulent boundary layers, Y Tsuji, JHM Fransson, PH Alfredsson, AV Johansson, Journal of Fluid Mechanics 585, 1-40, (2007).

[2] Transverse structure functions in high-Reynolds-number turbulence, B Dhruva, Y Tsuji, KR Sreenivasan, Physical Review E 56 (5), R4928, (1997).

[3] Numerical evidence of logarithmic regions in channel flow at R_tau=8000, Y Yamamoto, Y Tsuji, Physical Review Fluids 3 (1), 012602, (2018).

[4] Similarity scaling of pressure fluctuation in turbulence, Y Tsuji, T Ishihara, Physical Review E 68 (2), 026309, (2003).

[5] Mean wind in convective turbulence of mercury, Y Tsuji, T Mizuno, T Mashiko, M Sano, Physical review letters 94 (3), 034501, (2005).

[6] Friction factor and mean velocity profile for pipe flow at high Reynolds numbers, N Furuichi, Y Terao, Y Wada, Y Tsuji, Physics of Fluids 27 (9), 095108, (2015).

[7] Initial free surface instabilities on a high-speed water jet simulating a liquid-metal target, K Itoh, Y Tsuji, H Nakamura, Y Kukita, Fusion Technology 36 (1), 69-84, (1999).

[8] Instantaneous measurement of velocity fields in developed thermal turbulence in mercury, T Mashiko, Y Tsuji, T Mizuno, M Sano, Physical Review E 69 (3), 036306 (2004).

[9] Effects of the orifice to pipe diameter ratio on orifice flows,
F Shan, Z Liu, W Liu, Y Tsuji, Chemical Engineering Science 152, 497-506, (2016).

[10] Particle image velocimetry measurements of flow field behind a circular square-edged orifice in a round pipe, F Shan, A Fujishiro, T Tsuneyoshi, Y Tsuji,
Experiments in fluids 54 (6), 1-18, (2013).

[11] Probability density function in the log-law region of low Reynolds number turbulent boundary layer, Y Tsuji, I Nakamura, Physics of Fluids 11 (3), 647-658, (1999).

[12] Pressure fluctuation in high-Reynolds-number turbulent boundary layer: results from experiments and DNS, Y Tsuji, S Imayama, P Schlatter, PH Alfredsson, AV Johansson, I Marusic, Journal of Turbulence, N50, (2012).

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K Itoh, Y Tsuji, H Nakamura, Y Kukita, Fusion technology 37 (1), 74-88, (2000).

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KG Aivalis, KR Sreenivasan, Y Tsuji, JC Klewicki, CA Biltoft,
Physics of Fluids 14 (7), 2439-2446, (2002).

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S Kajita, N Ohno, S Takamura, Y Tsuji, Physics Letters A 373 (46), 4273-4277, (2009).

[16] Universality of probability density distributions in the overlap region in high Reynolds number turbulent boundary layers, B Lindgren, AV Johansson, Y Tsuji
Physics of fluids 16 (7), 2587-2591, (2004).

[17] Intermittency effect on energy spectrum in high-Reynolds number turbulence,
Y Tsuji, Physics of Fluids 16 (5), L43-L46, (2004).

[18] Fractality of self-grown nanostructured tungsten by He plasma irradiation,
S Kajita, Y Tsuji, N Ohno, Physics Letters A 378 (34), 2533-2538, (2014).

[19] Effects of flow field on the wall mass transfer rate behind a circular orifice in a round pipe, F Shan, A Fujishiro, T Tsuneyoshi, Y Tsuji,
International Journal of Heat and Mass Transfer 73, 542-550, (2014).

[20] Self-similar profile of probability density functions in zero-pressure gradient turbulent boundary layers, Y Tsuji, B Lindgren, AV Johansson,
Fluid dynamics research 37 (5), 293, (2005).

[21] Large-scale anisotropy effect on small-scale statistics over rough wall turbulent boundary layers, Y Tsuji, Physics of Fluids 15 (12), 3816-3828, (2003).

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[23] Further experiments for mean velocity profile of pipe flow at high Reynolds number, N Furuichi, Y Terao, Y Wada, Y Tsuji, Physics of Fluids 30 (5), 055101, (2018)

[24] Self-affine fractality of bifurcating arc trail in magnetized plasma,
S Kajita, N Ohno, Y Tsuji, H Tanaka, S Takamura, Journal of the Physical Society of Japan 79 (5), 054501, (2010).

[25] Amplitude modulation of pressure in turbulent boundary layer,
Y Tsuji, I Marusic, AV Johansson, International Journal of Heat and Fluid Flow 61, 2-11, (2016).

[26] Anisotropic pressure correlation spectra in turbulent shear flow,
Y Tsuji, Y Kaneda, Journal of fluid mechanics 694, 50-77, (2012).

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Y Tsuji, Physical Review E 59 (6), 7235, (1999).

[28] High-Reynolds-number experiments: the challenge of understanding universality in turbulence, Y Tsuji, Fluid dynamics research 41 (6), 064003, (2009).

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K Nakamura, T Furukawa, Y Hirakawa, T Kanemura, H Kondo, M Ida, ...,Y Tsuji,
Fusion engineering and design 86 (9-11), 2491-2494, (2011).

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R Kojo, Y Kuroda, M Kondo, Y Tsuji, Proceedings of 16th International Topical Meeting on Nuclear Reactor Thermal …, (2011).

[32] The fractal aspect of an iso-velocity set and its relationship to bursting phenomena in the turbulent boundary layer, Y Tsuji, I Nakamura,
Physics of Fluids 6 (10), 3429-3441, (1994).

[33] Pressure and spanwise velocity fluctuations in turbulent channel flows: Logarithmic behavior of moments and coherent structures,
A Mehrez, J Philip, Y Yamamoto, Y Tsuji, Physical Review Fluids 4 (4), 044601, (2019).

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Y Tsuji, JHM Fransson, PH Alfredsson, AV Johansson, Fourth International Symposium on Turbulence and Shear Flow Phenomena, (2005).

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H Serizawa, ...Y Tsuji, Nuclear Materials and Energy 9, 278-285, (2016).

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[41] Lagrangian trajectory of small particles in superfluid He II, W Kubo, Y Tsuji, Journal of Low Temperature Physics 187 (5), 611-617, (2017).

[42] Engineering validation and engineering design of lithium target facility in IFMIF/EVEDA project, E Wakai, H Kondo, T Kanemura, T Furukawa, Y Hirakawa, K Watanabe, ...Y Tsuji, Fusion Science and Technology 66 (1), 46-56, (2014).

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A Mehrez, Y Yamamoto, Y Tsuji, Fluid Dynamics Research 51 (1), 011407, (2019).

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N Sakaki, T Maruyama, Y Tsuji, Journal of Low Temperature Physics, 1-8, (2022).

[65] Correction method of measurement volume effects on time-averaged statistics for laser Doppler velocimetry, Y Wada, N Furuichi, Y Tsuji,
European Journal of Mechanics-B/Fluids 91, 233-243, (2022).

[66] Large-scale energetic coherent structures and their effects on wall mass transfer rate behind orifice in round pipe,
F Shan, SY Qin, Y Xiao, A Watanabe, M Kano, FY Zhou, ZC Liu, W Liu, Y Tsuji,
Journal of Fluid Mechanics 927, (2021).

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K Bhatt, Y Tsuji, Journal of Fluid Science and Technology 16 (3), JFST0018-JFST0018, (2021).