Takayuki YAMAGATA, Ph.D.

Assistant Professor
Program: Advanced Materials Science and Technology
Area: Advanced Mechanical Science and Engineering
Undergraduate: Dept. of Mechanical & Production Engineering
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Professional Expertise

His professional expertise encompasses flow visualization and measurement, and measurement-integrated (MI) simulation. He and his group have been developing a pressure measurement technique around obstacles in the flow, which integrates particle image velocimetry (PIV) and numerical methods. Recently, he has been interested in flow accelerated corrosion (FAC) and liquid droplet impingement (LDI), which are important phenomena for pipe wall thinning problems on the safety management and maintenance of nuclear power plants.

Research Fields of Interest

***Flow visualization and measurement*:**

Particle image velocimetry (PIV)

- Flow around a circular and semi-circular cylinder
- Flow behind an orifice in a circular pipe
- Curved swirling flow in a circular pipe
- Strongly buoyant jet
- Spray jet and cavitation jet

Laser induced fluorescence (LIF)

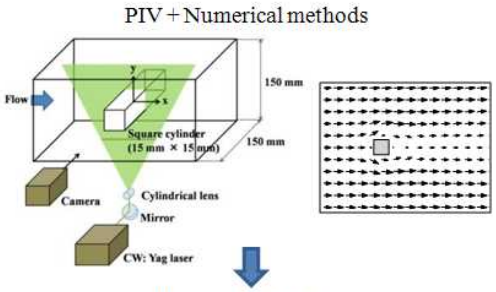
- Strongly buoyant jet

Numerical simulation

- Pressure analysis based on PIV data
- Pipe wall thinning prediction in power plant pipelines
- Measurement-integrated simulation

***Visualization techniques*:**

- Temperature measurement of methane flame by flame reaction
- Trajectory analysis of soccer balls by image correlation method



Pressure field evaluation using PIV data

LIF visualization of a buoyant jet

Education

2009: Ph.D. in Engineering, Graduate School of Engineering, Tohoku University, Japan
2006: M.S. in Engineering, Graduate School of Engineering, Tohoku University, Japan
2004: B.S. in Engineering, Department of Mechanical and Electrical Engineering, Tohoku University, Japan

Professional Societies and Activities

1. The Japan Society of Mechanical Engineers
2. The Visualization Society of Japan
3. The Society of Instrument and Control Engineers
4. Japan Society of Maintenology

Awards

1. Best visualization award in the 11th Asian Symposium on Visualization, 2011
2. Research encourage award (The Society of Instrument and Control Engineers), 2008
3. Best presentation award (The Society of Instrument and Control Engineers, Tohoku Chapter), 2006

Major Publications

Papers

[1]"Measurement of Sound Source Distribution around a Circular Cylinder in a Uniform Flow by Combined Particle Image Velocimetry and Microphone Technique", J. Wind Eng. Indust. Aerod., vol. 118, pp. 1-11, 2013.

[2]"Non-Axisymmetric Mass Transfer Phenomenon behind an Orifice in a Curved Swirling Flow", J. Flow Control Meas. Visual., vol. 1, no. 1, pp. 1-5, 2013.

[3]"The Mechanism of Asymmetric Pipe-Wall Thinning behind an Orifice by Combined Effect of Swirling Flow and Orifice Bias", Nucl. Eng. Des., vol. 252, pp. 19-26, 2012.

[4]"Experiments on Liquid Droplet Impingement Erosion by High-Speed Spray", Nucl. Eng. Des., vol. 250, pp. 101-107, 2012.

[5]"Critical Consideration on Wall Thinning Rate by Liquid Droplet Impingement Erosion", E-J. Adv. Maint., vol. 4, no. 2, pp. 79-87, 2012.

[6]"Mass Transfer Measurements behind an Orifice in a Circular Pipe Flow for Various Combinations of Swirl Intensity and Orifice Bias", J Power Energy Syst., vol. 6, no. 3, pp. 402-411, 2012.

[7]"Time-Resolved Scanning Stereo PIV Measurement of Three-Dimensional Velocity Field of Highly Buoyant Jet", J. Vis., vol. 15, no. 3, pp. 231-240, 2012.

[8]"Pressure Drop in Entrance Flows from Cavity to Slot of Viscoelastic Fluids inside Slot Die", J. Soc. Rheology Japan, vol. 40, no. 2, pp. 91-99, 2012.

[9]"Quantitative Visualization of Temperature Field in Non-luminous Flame by Flame Reaction Technique", J. Vis., vol. 15, no. 2, pp. 101-108, 2012.

[10]"Characteristics of Liquid Droplet Impingement Erosion of Carbon Steel with and without Oxide Film", Vis. Mech. Process., vol. 2, no. 2, DOI: 10.1615/VisMechProc.v1.i4.60, 2012.

[11]"Experimental and Numerical Study on Onset of Inflow in Near Field of Buoyant Jet at Low Froude Number", J. Vis., vol. 15, no. 1, pp. 67-75, 2012.

[12]"Measurement of Three-Dimensional Velocity Field of Buoyant Jet at Low Froude Number Using Time-Resolved Scanning Stereo PIV", Proc. 11th ASV, paper ASV11-02-08, 2011.

[13]"Effect of Contraction Width on the Vortex Formation of Viscoelastic Flow in Symmetric Planar Contractions", J. Fluid Sci. Technol., pp. 1011-1020, 2011.

[14]"Experiment on Liquid Droplet Impinging Erosion by High-speed Spray and Measurement of Droplet Parameters", Trans. Visual. Soc. Jpn., vol. 31, no. 11, pp. 63-67, 2011.

[15]"Visualization of Temperature and Velocity Fields of Flickering Flame by Combined Flame Reaction and PIV", J. Flow Vis. Image Process., vol. 18, no. 3, pp. 241-251, 2011

[16]"Investigation on Liquid Droplet Impinging Erosion (Evaluation of Erosion Rate by High-speed Spray)", Maintenology, vol. 10, no. 2, pp. 36-41, 2011.

[17]"Investigation on Pipe-wall Thinning by Flow-accelerated Corrosion (Mass Transfer Phenomenon by Combined Effect of Swirling Flow and Orifice Bias)", Maintenology, vol. 10, no. 2, pp. 30-35, 2011.

[18]"Investigation on Pipe-Wall Thinning by Flow Accelerated Corrosion (Occurrence of Asymmetrical Flow by Combined Effect of Swirling Flow and Orifice Bias", Trans. JSME Series B, vol. 77, no. 774, pp. 386-394, 2011.

[19]"Occurrence of asymmetrical flow pattern behind an orifice in a circular pipe", J. Vis., vol. 14, no. 1, pp. 15-17, 2011.

[20]"Flow Visualization and Scanning PIV Measurement of Three-Dimensional Structure in Near Field of Strongly Buoyant Jet", J. Vis., vol. 13, no. 3, pp. 203-211, 2010.

[21]"Vortex Formation in a Viscoelastic Entry Flow of Asymmetric Planar Contraction", J. Vis., vol. 13, no. 3, pp. 191-193, 2010.

[22]"Effect of Feedback Data Rate in PIV Measurement-Integrated Simulation", J. Fluid Sci. Technol., vol. 3, no. 4, pp. 477-487, 2008.

[23]"Reproduction of the Unsteady Pressure Field of Karman Vortex Street Behind a Square Cylinder by Hybrid Wind Tunnel", Trans. JSME Series B, vol. 74, no. 738, pp. 362-369, 2008.