Akiomi USHIDA, Ph.D. (Dr. Eng.)

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

His major research areas are micro fluid mechanics and environmental load-reducing technology. Especially, flow properties of several types of complex fluids in micro-sized flows are investigated, and washing effects using fine bubbles in laundry cleaning are observed, respectively. Micro fluid mechanics is the more attractive study in modern fluid mechanics. Their knowledge makes an impact on many applications (micro-mixing, micro-reactor, and energy-saving) and environment-conscious technology using fine bubble mixtures.

Research Fields of Interest

- Micro Fluid Mechanics

1. Anomalous phenomena of water flows through small apertures.
2. Flow properties of complex fluids and fine bubble mixtures passing through small apertures.
3. Drag reduction effects of complex fluids in capillary flows.

- Environmental Load-Reducing Technology

4. Washing effects of fine bubble mixtures in a laundry cleaning.
5. Effects of fine bubble mixtures on the washing rates of fresh vegetables.

Education

2010: Ph.D. in Engineering, Graduate School of Science and Technology, Niigata University, Japan
2007: M.S. in Engineering, Graduate School of Engineering, Nagoya University, Japan
2005: B.S. in Engineering, Faculty of Engineering, Niigata University, Japan

Professional Societies and Activities

1. The Japan Society of Mechanical Engineers
2. The American Society of Mechanical Engineers
3. The Japan Society of Fluid Mechanics
4. The Japanese Society for Multiphase Flow
5. The Society of Rheology, Japan
6. The Society of Chemical Engineers, Japan
7. Japan Oil Chemists' Society
8. The Japan Society for Computational Engineering and Science
9. The Japan Society for Industrial and Applied Mathematics
10. The Society of Polymer Science, Japan

Awards

1. The SRJ Research Award, The Society of Rheology, Japan (2016)

Major Publications

Papers

[1] Akiomi Ushida, Takatsune Narumi, Keiko Amaki, Taisuke Sato, and Tomiichi Hasegawa, Anomalous flow properties of spherical micelle surfactant solutions passing through small-sized slits, *International Journal of Heat and Fluid Flow*, Vol. 61, No. Part B, pp. 562-574, (2016)

[2] Tomiichi Hasegawa, Akiomi Ushida, Takatsune Narumi, and Masaki Goda, Is the water flow more or less than that predicted by the Navier-Stokes equation in micro-orifices ?, *Physics of Fluids*, Vol. 28, No. 9, Paper No. 092005, (2016)

[3] Akiomi Ushida, Akira Ichijo, Taisuke Sato, Tomiichi Hasegawa, and Takatsune Narumi, Pseudo-laminarization effect of several types of surfactant solutions in small-sized pipe flows, *Acta Mechanica*, Vol. 227, No. 8, pp. 2061-2074, (2016)

[4] Akiomi Ushida, Tomiichi Hasegawa, Taisuke Sato, and Takatsune Narumi, Flow properties of microbubble mixtures and complex fluids passing through micro-apertures, *Nihon Reoroji Gakkaishi*, Vol. 44, No. 3, pp. 119-129, (2016)

[5] Akiomi Ushida, Sotaro Murao, Tomiichi Hasegawa, Takatsune Narumi, and Keiko Amaki, Anomaly of pressure drops of rod-like micelle surfactant solutions passing through small orifices, *Experimental Thermal and Fluid Science*, Vol. 70, pp. 69-76, (2016)

[6] Tomiichi Hasegawa, Akiomi Ushida, and Takatsune Narumi, A simple expression for pressure drops of water and other low molecular liquids in the flow through micro-orifices, *Physics of Fluids*, Vol. 27, No. 12, Paper No. 122001, (2015)

[7] Akiomi Ushida, Tomiichi Hasegawa, Takatsune Narumi, Itaru Kourakata, and Yoshinori Nakamoto, Flow properties of ultra-fine bubble mixtures passing through micro-apertures, *Journal of Flow Control, Measurement & Visualization*, Vol. 3, No. 3, pp. 111-121, (2015)

[8] Akiomi Ushida, Tomiichi Hasegawa, and Takatsune Narumi, Anomalous phenomena in pressure drops of water flows through micro-orifices, *Microfluidics and Nanofluidics*, Vol. 17, No. 5, pp. 863-870, (2014)

[9] Akiomi Ushida, Tomiichi Hasegawa, and Takatsune Narumi, Anomalous phenomena in several types of liquid flows through small orifices in a range of low Reynolds numbers, *Experimental Thermal and Fluid Science*, Vol. 52, pp. 191-196, (2014)

[10] Akiomi Ushida, Tomiichi Hasegawa, Keiko Amaki, and Takatsune Narumi, Effect of microbubble mixtures on the washing rate of surfactant solutions in a swirling flow and an alternating flow, *Tenside Surfactants Detergents*, Vol. 50, No. 5, pp. 332-338, (2013)

[11] Akiomi Ushida, Tomiichi Hasegawa, Takatsune Narumi, and Toshiyuki Nakajima, Flow properties of nanobubble mixtures passing through micro-orifices, *International Journal of Heat and Fluid Flow*, Vol. 40, pp. 106-115, (2013)

[12] Akiomi Ushida, Tomiichi Hasegawa, Takehiro Hoshina, Shouta Kudou, Hiroshige Uchiyama, and Takatsune Narumi, Measurement and observation of jet thrust for water flow through micro-orifice, *ASME Journal of Fluids Engineering*, Vol. 134, No. 8, Paper No. 081201, (2012)

[13] Akiomi Ushida, Tomiichi Hasegawa, Toshiyuki Nakajima, Hiroshige Uchiyama, and Takatsune Narumi, Drag reduction effect of nanobubble mixture flows through micro-orifices and capillaries, *Experimental Thermal and Fluid Science*, Vol. 39, pp. 54-59, (2012)

[14] Akiomi Ushida, Tomiichi Hasegawa, Naoyuki Takahashi, Toshiyuki Nakajima, Shotaro Murao, Takatsune Narumi, and Hiroshige Uchiyama, Effect of mixed nanobubble and microbubble liquids on the washing rate of cloth in an alternating flow, *Journal of Surfactants and Detergents*, Vol. 15, No. 6, pp. 695-702, (2012)

[15] Akiomi Ushida, Tomiichi Hasegawa, Masato Kawami, Hiroshige Uchiyama, Takatsune Narumi, and Ryuichi Kayaba, Flow properties of microbubble/polyethylene glycol mixtures passing through orifices and slits, *Nihon Reoroji Gakkaishi*, Vol. 40, No. 2, pp. 61-68, (2012)

[16] Akiomi Ushida, Tomiichi Hasegawa, Shouta Kudou, Masato Kawami, Hiroshige Uchiyama, and Takatsune Narumi, Flow properties of several types of liquid flows through micro-orifices, *Journal of Fluid Science and Technology*, Vol. 6, No. 6, pp. 802-811, (2011)

[17] Akiomi Ushida, Tomiichi Hasegawa, and Takatsune Narumi, Drag reduction for liquid flow through micro-apertures, *Journal of Non-Newtonian Fluid Mechanics*, Vol. 165, No. 21-22, pp. 1516-1524, (2010)

[18] Tomiichi Hasegawa, Akiomi Ushida, and Takatsune Narumi, Huge reduction in pressure drops of water, glycerol/water mixture, and aqueous solution of polyethylene oxide in high speed flows through micro-orifices, *Physics of Fluids*, Vol. 21, No.5, Paper No. 052002, (2009)

Proceedings

Full Paper

[1] Akiomi Ushida, Akira Ichijo, Tomiichi Hasegawa, and Takatsune Narumi, Pseudo-laminarization of surfactant solutions in capillary flows, *Proc. of The 4th International Conference on Jets, Wakes and Separated Flows*, Paper No. ICJWSF2013-1075, (2013)

[2] Akiomi Ushida, Tomiichi Hasegawa, Takatsune Narumi, and Toshiyuki Nakajima, Drag reduction for nanobubble mixture flows through micro-apertures, *Proc. of The 11th International Conference on Nanochannels, Microchannels, and Minichannels*, Paper No. ICNMM2013-73085, (2013)

[3] Akiomi Ushida, Tomiichi Hasegawa, Hiroshige Uchiyama, and Takatsune Narumi, Flow properties for several kinds of liquid flows through micro-orifice, *Proc. of The ASME-JSME-KSME Joint Fluids Engineering Conference 2011*, Paper No. AJK2011-14003, (2011)

[4] Akiomi Ushida, Tomiichi Hasegawa, Takatsune Narumi, and Shouta Kudou, Anomalous behavior in jet thrusts and pressure drops of fluids flowing out of micro-orifices, *Proc. of The 4th International Symposium on Advanced Fluid/Solid Science and Technology in Experimental Mechanics*, Paper No. F-II-1, (2009)