

**Zeyad A. Almutairi**

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### **Research Interests:**

- Single phase and multiphase flow in microchannels.
- Experimental flow studies in macro and micro scales.
- Microfluidics research.
- Surface treatment of plastic microchannel materials.
- Renewable energy.
- Fuel cells technology.

### **Education:**

**2008 – 2014:** PhD in Mechanical Engineering at the University of Waterloo. My research was in the microfluidics area with focus on experimental studies of liquid droplet generation and transport in rectangular microchannels.

**2006 – 2008:** MSc in Mechanical Engineering at the University of Waterloo. My research was in the microfluidics area on the enhancement of electroosmotic flow in PDMS microchannels.

**1998 – 2003:** BSc in Mechanical Engineering sciences from King Saud University, Riyadh. The undergraduate project was on finding the effect of shading conditions on the optimum insulation thickness for concrete walls used in Saudi Arabia.

### **Skills:**

- Microscopy techniques: bright field, fluorescence and laser scanning confocal microscopy approaches and their application to microfluidic systems.
- Working with light sensors (PMT-photomultiplier tube and APD-Avalanche photo diode) for droplet detection in microchannels.
- Imaging techniques of flows in microchannels with low and high speed imaging.
- Optical thermometry of microfluidic processes in microchannels.
- Surface treatment of microchannels with UV grafting approaches.
- Computer skills: Dynamic Studio (Particle image velocimetry acquisition and analysis software), Comsol (Computational Fluid dynamics software), TecPlot 360, Matlab, NIS-Elements (Nikon Instruments microscope software), AutoCAD, ImageJ (image editing software).

## Experience:

- **2014 – To date:** Assistant Professor at the Department of Mechanical Engineering at King Saud University, Riyadh, Saudi Arabia.
- **2009 – 2014:** Teaching Assistant at the Department of Mechanical and Mechatronics Engineering at the University of Waterloo. During that period I was a TA several times for fluid mechanics course and one time for a math course (ordinary differential equations for engineers).
- **2004 – 2006:** Teaching Assistant at the Department of Mechanical Engineering at King Saud University. I was a T.A. for undergraduate thermofluid courses.
- **2003 – 2004:** Mechanical Engineer at the Department of Water Booster Stations, General Directorate of Water in Riyadh Region. My responsibilities during my work at the Department of Water Booster Stations, involved: supervising the mechanical technical staff, ensure that the mechanical equipment were working in proper and optimal conditions, and supervising contractors in on-going projects at the department.

## Professional Training:

- 2004, KSB pump training at KSB facilities, KSB, Frankenthal, Germany.
- 2001, Summer training at Riyadh Refinery Department, Saudi Aramco, Riyadh, Saudi Arabia

## Theses and Publications:

### *Theses:*

- **Master Thesis:** Characterization and Enhancement of Electroosmotic Flow in PDMS Microchannels, Zeyad Almutairi, University of Waterloo, 2008.
- **PhD Thesis:** Experimental Studies of the Hydrodynamics of Liquid Droplet Generation and Transport in Microchannels, Zeyad Almutairi, University of Waterloo, 2014.

### *Journal Publications:*

1. Almutairi, Z., Glawdel, T., Ren, C., & Johnson, D. (2009). A Y-channel design for improving zeta potential and surface conductivity measurements using the current monitoring method. *Microfluidics and Nanofluidics*, 6(2), 241-251. doi: 10.1007/s10404-008-0320-6
2. Almutairi, Z., Ren, C. L., & Simon, L. (2012). Evaluation of polydimethylsiloxane (PDMS) surface modification approaches for microfluidic applications. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 415(0), 406-412. doi: <http://dx.doi.org/10.1016/j.colsurfa.2012.10.008>

3. Glawdel, T., Almutairi, Z., Wang, S., & Ren, C. (2009). Photobleaching absorbed Rhodamine B to improve temperature measurements in PDMS microchannels. [10.1039/B805172K]. *Lab on a Chip*, 9(1), 171-174. doi: 10.1039/b805172k

**Conference presentations and proceedings:**

1. Almutairi, Z., Glawdel, T., Ren, C. L., Johnson, D., A Novel Y-Channel Design for Measuring The Zeta Potential using the Current Monitoring Technique, 2007 ASME International Mechanical Engineering Congress and R&D Expo, Seattle, WA, Nov. 11 -15, 2007.
2. Glawdel, T., Almutairi, Z., Wang, S., Ren, C., 2008. *Improving Rhodamine B Fluorescence Thermometry in PDMS Microchannels by Photobleaching Absorbed Dye* 669–675. doi:10.1115/IMECE2008-68851
3. Almutairi, Z., Ren, C., Johnson, D., 2010a. *Effects of Hydrophobic Recovery of Plasma Treated PDMS Microchannels on Surface Tension Driven Flow* 761–766. doi:10.1115/FEDSM-ICNMM2010-31243
4. Almutairi, Z., Ren, C., Simon, L., 2010b. *Improving the Electrokinetic Properties of PDMS With Surface Treatments* 331–333. doi:10.1115/FEDSM-ICNMM2010- 31241
5. Almutairi, Z., Glawdel, T., Ren, C.L., Johnson, D.A., 2011. *Experimental Studies of Liquid/Liquid Droplets Transport in Curved Microchannels*, in: *64th Annual Meeting of the APS Division of Fluid Dynamics. Presented at the 64th Annual Meeting of the APS Division of Fluid Dynamics, APS, Baltimore, MD.*
6. Almutairi, Z., Ren, C.L., Johnson, D.A., 2014. *Experimental Study of the Hydrodynamic Resistance of Liquid Droplets in Polycarbonate Microchannels*, in: *APS March Meeting 2014. Presented at the APS March Meeting 2014, APS, Denver, CO.*

**Membership:** American physics society APS.