Maziyar Jalaal *NSERC Canada Vanier Scholar*

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Department of Mechanical Engineering & Complex Fluid Laboratory • UBC • Vancouver • Canada

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Summary

I am a mechanical engineer with interest in experimental and theoretical fluid mechanics. Currently, I am a PhD candidate of Mechanical Engineering at the University of British Columbia. My research background is in interfacial fluid mechanics, numerical simulations, surface instabilities, complex fluids, droplets and fragmentation. I am also interested in porous media, turbulence, mixing, and chaos. I have started my research career from my second year undergraduate study and worked in several research labs and institutes since then.

Education

University of British Columbia   VANCOUVER, CANADA
   PhD in Mechanical Engineering   *Sep '12 – present*
     Complex Fluid Laboratory & Microsystem and Nanotechnology Group.
     Thesis title: Capillary Spreading of Complex Fluids, with Neil Balmforth & Boris Stoeber.

University of British Columbia   KELOWNA, CANADA
   MASc in Mechanical Engineering   *Sep '10 – June '12*
     School of Engineering, & Mehravaran Lab.
     Thesis title: Direct Numerical Simulation of Fragmentation of Droplets, with Kian Mehravaran.

University of Tabriz   TABRIZ, IRAN
   BSc in Fluid Mechanics   *Sep '5 – Aug '9*
     Department of Mechanical Engineering & Fluid Mechanics Research Laboratory.
     Thesis title: Experimental Investigations on Behaviour of Gas/Liquid and Liquid/Liquid Interfaces in the Presence of EHD Actuators, with Esmaeil Esmaeilzadeh.

Academic Research

Research Assistant   UBC, COMPLEX FLUIDS LAB
   Experimental and Theoretical study of complex fluids spreading.   *Sep '12 – present*

Research Associate   UBCO, GEOLOGY RESEARCH LAB
   Experimental Study on soil respiration.   *June '12 – Sep '12*

Research Assistant   UBCO, SCHOOL OF ENGINEERING
   Numerical Studies on fragmentation of liquids.   *Sep '10 – June '12*

Research Scientist   BABOL UNI. TECH., HEAT TRANSFER RESEARCH LAB
   Analytical studies on nonlinear differential equations.   *Aug '09 – Sep '10*

Undergraduate Research Assistant   UNI. TABRIZ, FLUID MECHANICS RESEARCH LAB
   Experimental studies on Electrohydrodynamics in Multiphase systems   *Apr '07 – Aug '09*

Teaching Assistantship

UBC: Elementary Fluid Mechanics, Mechanical Vibration, Fluid Mechanics II, Numerical methods in engineering, Alternative Energy Systems, Heat transfer, Dynamics, Fundamental Engineering.

Uni. Tabriz: Elementary Fluid Mechanics II, Elementary Fluid Mechanics I.

Selected Awards, Scholarships, and Fellowships

Department Nominee for UBC Applied Science Future Alumni Award	OCT '15
UBC Mechanical Engineering Leadership Achievement Award	MARCH '15
Vancouver Startup Weekend Choice Award	MARCH '14
UBC Mechanical Engineering Academic Achievement Award	FEB '14
UBC Mechanical Engineering Leadership Achievement Award	MARCH '14
Vanier Canada Graduate Scholarship - ($150,000 for 3 years)	SEP '13

UBC's premier Ph.D. Four Year Fellowship (4YF) - ($158,500 for 5 years)	Sep '12
UBC Entrance Scholarship	Sep '12
UBC Mechanical Engineering Academic Achievement Award	Jan '12
Annual Award of Computational Fluid Dynamic Society of Canada	May '12
UBCO Especial Award for the Best Research Poster (ranked 1st in the competition)	March '12
UBC University Graduate Fellowship	July '11
International Partial Tuition Scholarship	Sep '10 – Sep '13
UBC's Fellowship for M.Sc. in Mathematics - **Declined**	Sep '12
SFU's Fellowship for M.Sc. in Applied mathematics - **Declined**	Sep '12

Selected Service & Leadership Experience

President, UBC Mechanical Eng. Graduate Association | MEGA	April '14 – present
Founder and Chair, CSME Student Branch	May '13 – present
Representative, CUPE (TA Union) for Mechanical Engineering	May '14 – Sep '15
VP Academic, UBC Mechanical Eng. Graduate Association | MEGA	April '13 – April '14
Representative to the Dean's Council, UBCO Engineering	March '11 – March '12

Mentorship Experience

Supervised students for

DAAD Exchange Program	Fall – Winter '15 - '16
UBC Mechanical Engineering Introduction to Research	Spring – Summer '15
UBC Engineering Physics Final Projects	Fall – Winter '14 - '15
UBC Undergraduate Interdisciplinary Research Programh	Fall – Winter '14 - '15
DAAD Exchange Program	Spring – Summer '13,
UBC Engineering Co-op program	Spring – Summer '13

Peer Review

Refereed articles for

Journal of Fluid Mechanics,   Physics of Fluids,   Soft Matter,   I.J. Multiphase Flows
Fuel,   Food Functions   J. Computer and Math. Appl.,   Engineering Computations
Journal of Advanced Engineering Software,   IET Science, Measurement & Technology
Int. J. of Numerical Methods for Heat and Fluid Flow,   Powder Technology
Math. and Computer Modelling of Dynamical Systems,   Chemical Eng. Communication
Int. J. of Nonlinear Sciences and Numerical Simulation,   Advanced Powder Technology
Zeitschrift fur Naturforschung A,   Mathematical and Computer Modelling
Asia-Pacific Journal of Chemical Engineering,   Journal of Magnetism and Magnetic Materials

Technical Skills

Experimental Fluid Mechanics
PIV, Micro PIV, Confocal Microscopy, Optical Coherence Tomography, High Speed Imaging, SEM, X-ray Tomography, Shadowgraphy, Light Scattering, Linear and non-Liner Rheometry, Sensors and Actuators (pressure, flows, thermal, force etc.), Micro-Fabrication, Micro-Machining, Laser Machining, Surface Treatment, Surface Tension and Contact Angle Measurements, Surface Characterization Methods.

Computer and Technical Literacy
High proficiency at commercial software: Fluent, Comsol Multiphysics, LabView, Abaqus, SolidWorks, Ansys, EES, Matlab and MAPLE. Open-source technical codes: Gerris, Surfer, Open-foam. Full command of programming languages, C, C++, Fortran, and Python. High proficiency at all Operating Systems (Linux, Windows, MAC), Excel, Word, PowerPoint, and Latex.

Graphic Design and Film-Making
High proficiency at Corel Draw, Photoshop, and Corel Visual Studio.

Language
English, Farsi, French (un peu!)

Selected Journal Papers

For the full list of publications please see my Google Scholar page.   citation = 584, hi= 14, i10i = 16

[1] M Jalaal, N J Balmforth, and B Stoeber. Slip of spreading viscoplastic droplets. *Langmuir*, 31(44):12071–12075, 2015.

[2] M Jalaal and K Mehravaran. Transient growth of droplet instabilities in a stream. *Physics of Fluids (1994-present)*, 26(1):012101, 2014.

[3] Maziyar Jalaal and Boris Stoeber. Controlled spreading of thermo-responsive droplets. *Soft matter*, 10(6):808–812, 2014.

[4] M Jalaal, B Khorshidi, and E Esmaeilzadeh. Electrohydrodynamic (EHD) mixing of two miscible dielectric liquids. *Chemical Engineering Journal*, 219:118–123, 2013.

[5] M Jalaal and K Mehravaran. Fragmentation of falling liquid droplets in bag breakup mode. *International Journal of Multiphase Flow*, 47:115–132, 2012.

[6] S Ghafoori, M Motevalli, MG Nejad, F Shakeri, DD Ganji, and M Jalaal. Efficiency of differential transformation method for nonlinear oscillation: comparison with hpm and vim. *Current Applied Physics*, 11(4):965–971, 2011.

[7] M Jalaal, H Bararnia, and G Domairry. A series exact solution for one-dimensional non-linear particle equation of motion. *Powder Technology*, 207(1):461–464, 2011.

[8] M Jalaal, Soheil Soleimani, G Domairry, E Ghasemi, H Bararnia, F Mohammadi, and Amin Barari. Numerical simulation of electric field in complex geometries for different electrode arrangements using meshless local mq-dq method. *Journal of Electrostatics*, 69(3):168–175, 2011.

[9] B Khorshidi, M Jalaal, and E Esmaeilzadeh. Electrohydrodynamic instability at the interface between two leaky dielectric fluid layers. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 380(1):207–212, 2011.

[10] H Bararnia, M Jalaal, E Ghasemi, Soheil Soleimani, DD Ganji, and F Mohammadi. Numerical simulation of joule heating phenomenon using meshless rbf-dq method. *International Journal of Thermal Sciences*, 49(11):2117–2127, 2010.

[11] M Jalaal, DD Ganji, and G Ahmadi. Analytical investigation on acceleration motion of a vertically falling spherical particle in incompressible newtonian media. *Advanced Powder Technology*, 21(3):298–304, 2010.

[12] M Jalaal, B Khorshidi, E Esmaeilzadeh, and F Mohammadi. Behavior of a single bubble in a nonuniform dc electric field. *Chemical Engineering Communications*, 198(1):19–32, 2010.

[13] B Khorshidi, M Jalaal, E Esmaeilzadeh, and F Mohammadi. Characteristics of deformation and electrical charging of large water drops immersed in an insulating liquid on the electrode surface. *Journal of colloid and interface science*, 352(1):211–220, 2010.

Selected Conference Papers

For the full list please click here.

The spreading of a viscoplastic droplet by capillary action	APS 2015, Boston, USA NOV '15
Thermo-responsive polymers: from rheology to applications	VPF 2015, Banff, Canada OCT '15
Thermal arrest of droplets	Droplets 2015, Enschede, Holland OCT '15
Interfacial Instabilities on a droplet	APS 2013, Pittsburgh, USA NOV '13
Non-Boussinesq exchange flow over topography	APS 2013, Pittsburgh, USA NOV '13
A Model for the controlled release of TPA	CRS 2013, Honolulu, USA JULY '13
Breakup of a falling liquid drop: A DNS Study	APS 2011, Baltimore, USA Nov '11
An Electrohydrodynamics mixer	23rd CSSC, Kelowna, Canada JUNE '11

Paper Submitted & in Progress

- On the Rheology of the Pluronic F127, M.Jalaal, N.J. Balmforth, and B.Stoeber, Submitted to J. Rheology

- A Viscoplastic Contact Line Theory, M.Jalaal, N.J. Balmforth, and B.Stoeber, to be Submitted to JFM

- Spreading of Yield Stress Fluids by Capillary Action, M.Jalaal, N.J. Balmforth, and B.Stoeber, In Progress

- Optical Coherence Tomography of Droplets, M.Jalaal, C. Seyfert, N.J. Balmforth and B.Stoeber, In Progress

Papers from side projects to be submitted to arXiv

- Impact of a liquid jet on a super-hydrophobic surface, M. Jalaal

- Coalescence of Sessile Droplets, M. Jalaal

- Cell Injection from a nozzle, M. Jalaal, E. Cheng, B. Stoeber, K. Cheung

- Response of droplets in turbulent field, M. Jalaal, K. Mehravaran

- Multiscale modelling of non-Boussinesq exchange flows, M. Jalaal, G. Lawrence, B. Stoeber

- A model for shear-activated drug delivery, M. Jalaal, K. Letchford, B. Stoeber

Interests

Basketball, Football, American Football, Playing Cajon and Djembe.

References

Neil Balmforth	Professor, UBC Mathematics
Boris Stoeber	Associate Professor, UBC Mechanical Engineering
Sheldon Green	Professor & Head, UBC Mechanical Engineering
Rebecca Tyson	Associate Professor, UBC Mathematics
Kian Mehravaran	Research Fellow, IASS Potsdam