MRUGANK BHATT

1015 8th St SE, Apt. 217, Minneapolis, MN 55414
bhatt182@umn.edu ⋄ (612) · 598 · 3447 ⋄ www.linkedin.com/in/mrugank-bhatt-1886b130

PROFESSIONAL SUMMARY

• Accomplished computational physicist with over 7 years of collaborative and independent research experience in Computational Fluid Dynamics (CFD), numerical modeling of complex engineering problems, grid generation and solver development in massively parallel environment.

• Experience with statistical analysis, Machine Learning (ML) algorithms and commercial Deep Learning (DL) framework; and passionate about their applications to the diverse engineering problems.

• Excellent written and oral communication skills demonstrated through journal publications, conference presentations and teaching.

EDUCATION

University of Minnesota -Twin Cities, USA *May 2020 (expected)*
PhD in Aerospace Engineering & Mechanics (GPA: 3.93/4.00)
M.S. in Aerospace Engineering & Mechanics, Minor in Mathematics (GPA: 3.97/4.00) *Dec 2017*

Indian Institute of Technology (IIT) Kharagpur, India *May 2014*
B.Tech. (Hons.) in Aerospace Engineering, Minor in Mechanical Engineering (GPA: 9.04/10)
Institute Silver Medal, for highest GPA in the department.

RESEARCH/WORK EXPERIENCE

Graduate Research Assistant, Computational Fluid Laboratory *Aug 2014 - present*
University of Minnesota -Twin Cities, USA. (PhD thesis, adviser: Prof. Krishnan Mahesh)

• Developed Large Eddy Simulation (**LES**) capabilities to study cavitation on marine propulsors in the in-house **parallel compressible multiphase** solver **MPCUGLES**.
• Created complex grids of **O(10millions)** consisting of hybrid hexahedrons, tetrahedrons, prisms and pyramids using hybrid **Gridpro/Pointwise** mesh generators.
• Distinguished **bubbly shock waves** and **re-entrant jet** mechanisms for sheet to cloud transition.
• Published/(under review) in 2 peer-reviewed journals, 4 conference papers & 4 conference presentations.

Undergraduate Research Assistant, Microfluidics Laboratory *August 2013 - April 2014*
Indian Institute of Technology Kharagpur, India. (B.Tech. thesis, guide: Prof. Suman Chakraborty)

• Derived modifications to the Lucas-Washburn equation to include liquid slip for studying capillary filling.
• Derived scaling laws and stability parameters to characterize regimes of capillary filling.

Summer Intern, Cardiovascular and Cellular Engineering Lab. *May 2013- July 2013*
Laboratoire d'Hydrodynamique (LadHyX), Palaiseau, France

• Developed **computational models for the human placenta** in collaboration with medical doctors.
• Systematically increased the complexity of CFD simulations, from simple 2D models to include porous media, non-newtonian effects and finally 3D calculations from the real scan of placental villies.
• For the first time an estimation of wall shear stress (WSS) is provided on syncytiotrophoblast (STB).
• Published a **research paper** and **2 short communications** in scientific peer-reviewed journals forming the basis for future physiologically-relevant in-vitro studies.

RELATED PROJECTS

Surgical skill classification using Artificial Neural Networks (ANN). *Sep 2018 - Dec 2018*
University of Minnesota -Twin Cities. (Related courses : Intro. ML , Machine Learning, Matrix theory)

• Established framework for classification of robotic surgeons based on the training set of 450 surgeons on 43 dimensional time series data of Basic Laparoscopic Urological Skills (BLUS).
• Extracted important features of the data using Linear Discriminant Analysis (**LDA**) and Random Forests.
• Achieved $> 90\%$ accuracy using Long Short-Term Memory (**LSTM**) networks among the evaluated ANNs.

SKILLS & EXPERTISE

Programming : Fortran, Matlab, C, MPI, Python, Tensorflow/Keras
Simulation tools : COMSOL, ANSYS
Grid/Surface generation : Pointwise, Gridpro
Visualization/processing : Tecplot, Paraview, Blender
Office tools : Latex, Microsoft Powerpoint, Word, Excel, Git, Vim/Emacs
Operating systems : Linux, Mac, Windows

SELECTED PUBLICATIONS

• **Mrugank Bhatt** and Krishnan Mahesh, "Numerical investigation of partial cavitation regimes over a sharp wedge using large eddy simulation", International Journal of Multiphase Flows, (Manuscript submitted) Aug, 2019.

• **Mrugank Bhatt** and Krishnan Mahesh, "Investigation of propeller cavitation using compressible large eddy simulations", Sixth International Symposium on Marine Propulsors, Rome, Italy, 2019.

• Filipe Brandao, **Mrugank Bhatt** and Krishnan Mahesh, "Numerical study of cavitation regimes in a flow over a circular cylinder", Journal of Fluid Mechanics, (Manuscript revised) Sep, 2019.

• Edouard Lecarpentier, **Mrugank Bhatt**, Gwladys Bertin, Benjamin Deloison, Laurent Salomon, Philippe Deloron, Thierry Fournier, Abdul Barakat and Vassilis Tsatsaris, "Computational fluid dynamic simulations of maternal circulation: wall shear stress in the human placenta and its biological implications", PLOS One, 11(1) (2016).

• **Mrugank Bhatt**, Aswin Gnanaskandan and Krishnan Mahesh, "Evaluation of finite rate homogeneous mixture model in cavitation bubble collapse", 9^{th} International Symposium on Cavitation, Lausanne, Switzerland, 2015.

AFFILIATIONS & LEADERSHIP EXPERIENCE

Student Member of American Physical Society (APS). *July, 2016 - present*
• Presented (oral/poster) latest findings of doctoral research work annually.

Teaching Assistant at University of Minnesota -Twin Cities, USA. *Aug, 2014 - May, 2015*
• Instructed senior undergraduate students for Aero-mechanics and Instrumentation lab sessions

Volunteered at Student Welfare Group, IIT Kharagpur, India. *July, 2012 - May, 2013*
• Mentored freshman students regarding campus lifestyle, undergraduate studies and career planning.

Secretary of the "Department of Aerospace Engineering", IIT Kharagpur, India. *July 2011 - May, 2012*
• Designed the official website of Department of Aerospace Engineering.

HOBBIES

Singing; Playing variety of musical instruments; Yoga/Meditation; Swimming; Cooking .