

BRIAN MIN YUN

United States Citizen

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EDUCATION

Georgia Institute of Technology **Aug 2005 - Present (Expected Graduation: Summer 2012)**

Ph.D. in Mechanical Engineering (GPA: 3.71/4.0)

- Research: Computational Modeling of Blood Damage in Bileaflet Mechanical Heart Valves
Computational Modeling of Particle Migration Trajectories in Pipe Flows
- Advisors: Dr. Cyrus K. Aidun, Dr. Ajit P. Yoganathan
- Dissertation Title - "Simulations of pulsatile flow through bileaflet mechanical heart valves using a novel suspension flow method: To assess blood damage"

Georgia Institute of Technology

Aug 2005 - May 2008

M.S. in Mechanical Engineering (GPA: 3.71/4.0)

- Research: Computational Modeling of Turbulent Swirling Flow through Pipes
- Minor in Applied Mathematics

Cornell University

Aug 2001 - May 2005

B.S. in Mechanical and Aerospace Engineering (GPA: 3.1/4.0)

- Minor in Applied Mathematics

COMPUTER SOFTWARE/PROGRAMMING LANGUAGES

AutoCAD, ANSYS, AppleScript, C/C++, Eclipse, ffmpeg, Fluent, Gambit, Gantt, Git, Gnuplot, GraphClick, ICEM, iLife/iWork, Inkscape, LaTeX, Linux/Unix, Mac OS, MATLAB, MPI, MS Office, MS Windows, Paraview, Python, Tecplot, XCode

RELEVANT ACADEMIC RESEARCH PROJECTS

Georgia Institute of Technology Research Projects

Computational Modeling of Blood Damage in Bileaflet Mechanical Heart Valves **Jan 2010 - Present**

- Numerical simulations of blood flow through prosthetic mechanical heart valves
- Studying damage of platelets that eventually causes thrombosis (unwanted blood clotting)
- Research used to optimize designs of bileaflet mechanical heart valves to reduce complications and ultimately extend expected lifetime
- Two articles published by *Annals of Biomedical Engineering*, preparing multiple additional articles

Computational Modeling of Particle Migration Trajectories in Multiphase Pipe Flows **May 2008 - Present**

- Observing the effects of deformability and varying Reynolds number on the lateral migration of suspended particles in Poiseuille flow
- Developed hybrid lattice-Boltzmann/FEA (LBM-FEA) code to model multiphase flow with the inclusion of deformability effects with the use of high performance parallel processing
- Preparing article for publication to *Journal of Fluid Mechanics*

Development of Parallelized LBM-EBF Code for Multiphase Flow Modeling **May 2009 - Present**

- An extension of the LBM-FEA code using the External Boundary Force (EBF) Method
- Allows for higher modeling accuracy as well as speed of simulation

Computational Modeling of Turbulent Swirling Flow Through Pipes **Aug 2005 - May 2008**

- Observing secondary counter-rotating vortices in turbulent swirling flow through pipes
- Use of GAMBIT and FLUENT software to model turbulent fluid flow

Cornell University Research Projects

Airfoil Design and Testing **Fall 2004 - Spring 2005**

- Optimization of airfoil design given random flying conditions with numerical and physical tests

Wind Tunnel Testing **Fall 2004**

- Small scale modeling in Wind Tunnel Research Laboratory with Professor C. Williamson

Tensile Loading of Zylon Fibers

Summer 2004

- Testing of Zylon fibers under tensile load, used for the study of pressure vessel design

WORK EXPERIENCE

Research Engineer

May – Aug 2004

- Theoretical and Applied Mechanics at Cornell University

Research Engineer

May – Aug 2001

- Macromolecular Engineering at Case Western Reserve University

TEACHING EXPERIENCE

Teaching Assistant: Undergraduate Fluid Mechanics

Spring 2009

- Gave 6 lectures to 80 undergraduate students in Mechanical Engineering class, "Introduction to Fluid Mechanics"
- Held 3 review sessions, held office hours, graded all tests

PROFESSIONAL SOCIETY MEMBERSHIPS

American Physical Society (APS) – Division of Fluid Dynamics

American Society of Mechanical Engineers (ASME)

AWARDS/GRANTS/SCHOLARSHIPS

Georgia Institute of Technology

NIH Grant R01-HL-07262, Institute of Paper Science and Technology Research Grant

Cornell University

Kraft Foods Scholarship, Charles D. Miller Scholarship, Clarice Miller Scott Scholarship

Other

National Champion Award, Continental Mathematics League 2001

PUBLICATIONS

Yun B.M., Wu J., Simon H.A., Sotiropoulos F., Arjunon S., Aidun C.K., Yoganathan A.P. "A numerical investigation of blood damage in the hinge area of aortic bileaflet mechanical heart valves during the leakage phase" *Annals of Biomedical Engineering*, 2012. (accepted, published online)

Wu J., Yun B.M., Fallon A.M., Hanson S.R., Aidun C.K., Yoganathan A.P. "Numerical investigation of the effects of channel geometry on platelet activation and blood damage" *Annals of Biomedical Engineering*, 2011. 39(2): p. 897-910.

Yun B.M., Aidun C.K., Yoganathan A.P. "Simulations of pulsatile flow through bileaflet mechanical heart valves with asymmetric leaflet motion" *Physics of Fluids* (in preparation)

Yun B.M., Khiabani R., Aidun C.K., Yoganathan A.P. "Simulations of pulsatile flow through artificial pulmonary heart valves with curved vessels" *Journal of Biomechanics* (in preparation)

Yun B.M., Aidun C.K., Yoganathan A.P. "Numerical investigation of parameter variation in bileaflet mechanical heart valve design in order to assess blood damage potential" *Annals of Biomedical Engineering* (in preparation)

Yun B.M., Aidun C.K., Yoganathan A.P. "Simulations of flow through a novel bileaflet mechanical heart valve design in order to assess blood damage potential" *Annals of Biomedical Engineering* (in preparation)

Yun B.M., Aidun C.K. "Lateral migration of a deformable spherical particle in Poiseuille flow" *Journal of Fluid Mechanics* (in preparation)

CONFERENCE PRESENTATIONS

Wu J., Yun B.M., Fallon A.M., Simon H.A., Aidun C.K., Yoganathan A.P. "Numerical investigation of blood damage in the hinge area of bileaflet mechanical heart valves" *American Society of Mechanical Engineers: Summer Bioengineering Conference*, Naples, FL. June 2010.

Yun B.M., Wu J., Simon H.A., Sotiropoulos F., Aidun C.K., Yoganathan A.P. "A numerical investigation of blood damage in the hinge area of bileaflet mechanical heart valves" *American Physical Society: Division of Fluid Dynamics*, Long Beach, CA. November 2010.

Yun B.M., Wu J., Aidun C.K., Yoganathan A.P. "Simulations of flow through bileaflet mechanical heart valves to assess platelet damage" *American Society of Mechanical Engineers: Summer Bioengineering Conference*, Farmington, PA. June 2011

Yun B.M., Aidun C.K., Yoganathan A.P. "Simulations of pulsatile flow through bileaflet mechanical heart valves to assess platelet damage" *FDA Workshop: Computational Methods for Cardiovascular Devices*, Silver Spring, MD. September 2011

Yun B.M., Aidun C.K., Yoganathan A.P. "Simulations of flow through bileaflet mechanical heart valves with asymmetric leaflet motion" *American Society of Mechanical Engineers: Summer Bioengineering Conference*, Fajardo, Puerto Rico. June 2012

AWARDED PROPOSALS

Aidun C.K., Yun B.M., and Mehrabadi M., "A Coupled Lattice Boltzmann and Finite Element Method for Modeling Fluid-Structure Interaction," National Science Foundation research proposal for the TeraGrid resource, 2012.

Aidun C.K., Reasor D.A., Yun B.M., and Mehrabadi M., "A Coupled Lattice Boltzmann and Finite Element Method for Modeling Fluid-Structure Interaction," National Science Foundation research proposal for the TeraGrid resource, 2011.