# BONG JAE CHUNG

*Curriculum Vitae*

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Department of Bioengineering
Volgenau School of Engineering
George Mason University
Fairfax, VA 22030

**CITIZENSHIP**

United States

**CONCENTRATION**

Computational Fluid Dynamics (CFD), Fluid Mechanics, Biofluids, Biomechanics, Continuum Mechanics

**EDUCATION**

**Ph.D.** University of Pittsburgh, 2004, Mechanical Engineering, Advisor: Professor A.M. Robertson, Thesis: "*Studies of Blood Flow in Arterial Bifurcations: from Influence of Hemodynamics on Endothelial Cell Response to Vessel Wall Mechanics*"
**M.S.** University of Pittsburgh, 1997, Mechanical Engineering, Thesis: "*A Bubble Trajectory in a Stirred Column*"
**B.S.** Kyung Hee University, South Korea, 1990, Physics

**PROFESSIONAL POSITIONS HELD**

**Research Assistant Professor** George Mason University, Department of Bioengineering & School of Physics, Astronomy, and Computational Sciences, 2013-Current
**Instructor (Physics)** Northern Virginia Community College, Science, Technology and Business Division, 2014-Current
**Adjunct Faculty** University of Pittsburgh, Department of Mechanical Engineering, 2009-2013
**Postdoctoral Research Associate** University of North Carolina at Chapel Hill, Department of Marine Science, 2007-2009
**Postdoctoral Research Associate** University of North Carolina at Chapel Hill, Department of Mathematics, 2006-2007
**Postdoctoral Fellow** Johns Hopkins University, Department of Biomedical Engineering, 2004-2006
**Postdoctoral Researcher** University of Pittsburgh, Department of Mechanical Engineering, and Department of Chemical Engineering, April 2004-August 2004

**VISITING POSITIONS**

**Visiting Researcher at the Bernoulli Center** Invited visitor at the Swiss Federal Institute of Technology (EPFL) developing nonlinear constitutive models for the arterial wall (July 2-16, 2003)
**Visiting Researcher at University of California, Davis** Developing CFD code based on Chimera grid scheme to study blood flow (May 10-17, 1999)

**RESEARCH EXPERIENCES / INTERESTS**

1. Blood flow in patient specific cerebral aneurysms from 3DRA or CTA images using CFD based on finite element method with OpenMP code by image segmentation tools (VMTK, ITK-SNAP, or In-house Code)
2. Blood flow in retinal arterial macroaneurysms (RAM) from 2D patient specific images using CFD based on finite element method with OpenMP code
3. Wall properties of artery and aneurysm using continuum theory and experiments
4. Fluid mechanics of eye using CFD based on finite difference method and commercial softwares ADINA, COMSOL
5. Steady and unsteady behavior of particles in Newtonian and non-Newtonian fluids using CFD based on finite difference method, immersed boundary method (IB) and experiments

6. Non-equilibrium thermodynamics and pattern selection
7. Sediment transport in turbulent layers using CFD based on finite difference method, IB, and Large Eddy simulation (LES) through Message Passing Interface (MPI), and FLUENT (GAMBIT)
8. Probability density function of scalars in double gyres in ocean flows using CFD based on finite volume method
9. Computational modeling of RBC aggregation in microcirculation using CFD based on finite volume method and Chimera grids
10. Pneumatic conveyer experiment
11. Parametric studies on blood flows in bifurcated vessels using CFD (ADINA) with Pro/Engineer and Solidworks
12. Numerical design of flow chambers to test endothelial cells exposed to fluid flows using CFD (ADINA, ANSYS)

## TEACHING EXPERIENCES

**Teaching**
  Teaching *Physics* at Northern Virginia Community College as an instructor, 2014-Current
**Mentoring**
  i)  Co-adviser for Ph.D. students for their research projects on CFD simulation of human cerebral aneurysms, George Mason University, 2013-Current
  ii) Thesis committee member for M.S. student in Applied Mathematics, Montclair State University, 2015, 2016
  iii) Co-adviser for two undergraduate students for their research projects on vortex induced oscillations, University of North Carolina at Chapel Hill, 2007-2009
  iv) Co-adviser for undergraduate students for their project on the mechanical design of flow chambers, University of Pittsburgh, 2003-2004
**Tutoring**
  Tutoring middle, high and college school students in Mathematics, Physics, Science, 2009-Current
**Guest Lecturer**
  Lectured *non-Newtonian 3000 level course* in University of Pittsburgh, Department of Mechanical Engineering, 08/27/03-12/15/03
**Teaching Assistant**
  Teaching Assistant at the international school on Biomathematics, Bioengineering and Clinical Aspects of Blood Flow at the Mathematical Sciences Research Institute (MSRI), Berkeley, California (7/23/02-8/9/02)
**Teaching Assistant**
  University of Pittsburgh, Department of Mechanical Engineering, Subjects: *Fluid Mechanics, Dynamics, Thermodynamics, Heat Transfer, and Solid Mechanics*, 1997-2002

## PUBLICATIONS

**Refereed Papers**

1. B. Chung, A.M. Robertson, D.G. Peters, "The numerical design of a parallel plate flow chamber for investigation of endothelial cell response to shear stress", *Computers and Structures*, 81: p.535-546, 2003.
2. B. Chung, P.C. Johnson, A.S. Popel, "Application of Chimera grid to modeling cell motion and aggregation in a narrow tube", *International Journal for Numerical Methods in Fluids*, 53(1): p.105-128, 2006.
3. B.J. Chung, A. Vaidya, R. Wulandana, "Stability of steady flow in a channel with linear temperature dependent viscosity", *International Journal of Applied Mathematics and Mechanics*, 2(1): p.24-33, 2006.
4. B.J. Chung, A.Vaidya, "An Axiomatization of Realities", *Mathematical Connections*, Series II, Number 4, pages 1-21, 2008.
5. B. Chung, A. Vaidya, "Optimal principle in fluid structure interaction", *Physica D*, 237: p. 2945-2951, 2008.
6. R. Camassa, B. Chung, P. Howard, R.M. McLaughlin, A. Vaidya, "Vortex induced oscillations of cylinders at low and intermediate Reynolds numbers", *Advances in Mathematical Fluid Mechanics: A Tribute to Giovanni Paolo Galdi*, Editor: A. Sequeira and R. Rannacher, Springer Verlag, 2008.
7. B. Chung, S. Kim, P. C. Johnson, A.S. Popel, "Computational fluid dynamics of aggregating red blood cells in postcapillary venules", *Computer Methods in Biomechanics and Biomedical Engineering*, Vol. 12, Issue 4, pp. 385-397, 2009.
8. Z. Zeng, B.J. Chung, M. Durka, A.M. Robertson, "An in vitro device for evaluation of cellular response to flows found at the apex of arterial bifurcations", *Advances in Mathematical Fluid Mechanics*, pp. 631-657, DOI: 10.1007/978-3-642-04068-9_35, 2010.

9. B.J. Chung, A. Vaidya, "On the slow motion of a sphere in fluids with non-constant viscosities", *International Journal of Engineering Science*, Vol. 48, Issue 1, pp. 78-100, 2010.

10. B.J. Chung, G. Gipson, A. Shenoy, A. Vaidya, "Image analysis of wake structure past finite cylinders", *International Journal of Imaging*, Vol. 4, No. A10, pp.18-32, 2010.

11. S. Achuthan, B.J. Chung, P. Ghosh, V. Rangachari, A. Vaidya, "A modified Stokes-Einstein's equation for A-beta aggregation, *BMC Bioinformatics*, 12(Suppl10):S13, 1-13, 2011.

12. B.J. Chung, A. Vaidya, "A Non-equilibrium pattern selection in particle sedimentation", *Applied Mathematics and Computation*, Vol. 218 (7), 3451-3465, 2011.

13. B.J. Chung, A. Vaidya, "On the Affordances of the MaxEP Principle", *European Physical Journal B*, 87: 20, 2014.

14. B. Chung, J.R. Cebral, "CFD for evaluation and treatment planning of aneurysms: review of proposed clinical uses and their challenges", *Annals of Biomedical Engineering*, 43(1):122-38, DOI: 10.1007/s10439-014-1093-6, 2014.

15. B. Chung, F. Mut, R. Karidvel, R. Lingineni, D.F. Kallmes, J.R. Cebral, "Hemodynamic analysis of fast and slow aneurysm occlusions by flow diversion in rabbits", *Journal of NeuroInterventional Surgery*, *2015;7:931-935,* DOI:10.1136/neurintsurg-2014-011412, 2014.

16. J.R. Cebral, X. Duan, B.J. Chung, C. Putman, K. Aziz, A.M. Robertson, "Wall mechanical properties and hemodynamics of unruptured intracranial aneurysms", *American Journal of Neuroradiology*, 36: 1695-1703, DOI:10.3174/ajnr.A4358, 2015.

17. B. Chung, M. Cohrs, W. Ernst, G. Galdi, A. Vaidya, **"**Wake-cylinder interactions of a hinged cylinder at low and intermediate Reynolds numbers", *Archives of Applied Mechanics*, Vol. 86, Issue 4, pp 627–641, DOI: 10.1007/s00419-015-1051-2, 2015.

18. P. Berg, C. Roloff, O. Beuing, S.I. Sugiyama, N. Aristokleus, A. Anayiotos, N. Ashton, N. Bressloff, A. Brown, B.J. Chung, J.R. Cebral, G. Copelli, W. Fu, A. Qiao, A. Geers, S. Hodis, D. Dragomir-Daescu, E. Imdieke, M. Khan, Valen Sendstad, K. Kono, H. Meng, J. Xiang, P. Menon, P. Albal, O. Mierka, R. Munster, H. Morales, J. Osman, L. Goubergrits, J. Pallares, S. Cito, A. Passalacqua, S. Piskin, K. Pekkan, S. Ramalho, N. Marques, S. Sanchi, K. Schumacher, J. Sturgeon, H. Svihlova, J. Hron, G. Usera, M. Mendina, D. Steinman, G. Janiga, "The Computational fluid dynamics rupture challenge 2013 – phase II: Variability of hemodynamic simulations in two intracranial aneurysms", *Journal of Biomechanical Engineering,* Vol. 137 / 121008-1, DOI: 10.1115/1.4031794, 2015.

19. W. Brinjikji, B. Chung, C. Jimenez, C. Putman, D.F. Kallmes, J.R. Cebral, "Hemodynamic differences between unstable and stable unruptured aneurysms independent of size and location: pilot study", *Journal of NeuroInterventional Surgery*, DOI: 10.1136/neurintsurg-2016-012327, 2017;9: 376-380.

20. J.R. Cebral, X. Duan, P.S. Gade, B.J. Chung, F. Mut, K. Aziz, A.M. Robertson, "Regional mapping of flow and wall characteristics of intracranial aneurysms", *Annals of Biomedical Engineering*, DOI: 10.1007/s10439-016-1682-7, 2016 Dec;44(12): 3553-3567.

21. B. Chung, D. Platt, A. Vaidya, "The Mechanics of Clearance in a non-Newtonian Lubrication Layer", *International Journal of Non-Linear Mechanics*, DOI: 10.1016/j.ijnonlinmec.2016.08.010, 2016, Vol. 86, 133-145.

22. J.R. Cebral, E. Ollikainen, B. Chung, F. Mut, V. Sippola, B.R. Jahromi, R. Tulamo, J. Hernesniemi, M. Niemelä, A. Robertson, and J. Frösén, "Flow conditions in the intracranial aneurysm lumen associate with inflammation and degenerative changes of the aneurysm wall", *American Journal of Neuroradiology*, 2017. Jan; 38(1): 119-126.

23. R. Doddasomayajula, B. Chung, F. Hamzei-Sichani, C. M. Putman, J.R. Cebral, "Differences in hemodynamics and rupture rate of aneurysms at the bifurcation of the basilar and internal carotid arteries, *American Journal of Neuroradiology*, DOI: 10.3174/ajnr.A5088, 2017 Mar;38(3): 570-576.

24. D. Castillo, B. Chung, K. Schnitzer, K. Sorriano, H. Su, A. Vaidya, "Metastable states in terminal orientation of hinged symmetric bodies in a flow", *International Journal of Engineering Science*, DOI: 10.1016/j.ijengsci.2016.11.004, Vol. 111, 19-27, 2017.

25. J.R. Cebral, B.J. Chung, D. Ruijters, F. Nijnatten, F. Mut, P. Moret, S. Laurent, "Understanding angiography-based aneurysm flow fields through comparison to computational fluid dynamics", *American Journal of Neuroradiology*, DOI: 10.3174/ajnr.A5158, 2017 Jun;38(6): 1180-1186.

26. B. Chung, F. Mut, W. Brinjikji, F. Hamzei-Sichani, C. Jimenez, C. Putman, D.F. Kallmes, P.M. Christopher, M. Pritz, F. Detmer, J.R. Cebral, "Angio-architectures and hemodynamics characteristics of posterior communicating artery aneurysms and their association with rupture status", *American Journal of Neuroradiology*, August 2017, DOI: https://doi.org/10.3174/ajnr.A5358.

27. R. Doddasomayajula, B. Chung, F. Mut, C. M. Jimenez, F. Hamzei-Sichani, C. M. Putman, and J. R. Cebral, " Hemodynamic characteristics of ruptured and unruptured multiple aneurysms at mirror and ipsilateral locations", *American Journal of Neuroradiology*, 2017 Oct 5. DOI: 10.3174/ajnr.A5397.

28. B.J. Chung, B. Ortega, A. Vaidya, "Entropy production in a fluid-solid system far from thermodynamic equilibrium", *European Physical Journal E*, 2017, 40:105 DOI: 10.1140/epje/i2017-11595-3.

29. B. Waleed, B.J. Chung, J.R. Cebral, Y. Ding, J. Wald, F. Mut, Kadir, D. Kallmes, A. Rouchaud, G. Lanzino, "Hemodynamic characteristics of stable and unstable vertebrobasilar dolichoectatic and fusiform aneurysms", accepted in *Journal of NeuroInterventional Surgery*, 2018.

30. Detmer, F.J., Chung, B.J., Mut, F. et al., "Development and internal validation of an aneurysm rupture probability model based on patient characteristics and aneurysm location, morphology, and hemodynamics", *International Journal of Computer Assisted Radiology and Surgery*, 2018, https://doi.org/10.1007/s11548-018-1837-0.

31. Detmer, F.J., Chung, B.J., Mut, F. et al., "Development of a statistical model for discrimination of rupture status in posterior communicating artery aneurysms', *Acta Neurochir*, 160: 1643, 2018, https://link.springer.com/article/10.1007%2Fs00701-018-3595-8.

32. B.J. Chung, M. Fernando, C.M. Putman, F. Hamzei-Sichani, W. Brinjiki, D. Kalmes, C.M. Jimenez, J.R. Cebral, "Identification of hostile hemodynamics and geometries of cerebral aneurysms: a case-control study", *American Journal of Neuroradiology,* August 2018, DOI: https://doi.org/10.3174/ajnr.A5764.

33. P. Berg, et al., "Multiple Aneurysms AnaTomy CHallenge 2018 (MATCH) - Phase I: Segmentation", accepted in Cardiovascular Engineering and Technology, 2018.

## Papers in submission

1. J.R. Cebral, B.J. Chung, R. Lohner, F. Mut, C. Kallmes, J. Pulido, "Computational modeling of blood flow in retinal arterial macroaneurysm", submitted in 2017.

2. Detmer, F.J., Chung, B.J., Jimenez, C. et al., "Associations of hemodynamics, morphology, and patient characteristics with aneurysm rupture stratified by aneurysm location" submitted in 2018.

3. F. Mut, B,Chung, et al., "Image-Based Modeling of Blood Flow in Cerebral Aneurysms Treated with Intrasaccular Flow Diverting Devices", submitted in 2018.

4. Detmer, F.J., Chung, B.J., et al. "Local hemodynamic conditions associate with focal changes in the intracranial aneurysm wall", submitted in 2018.

5. B.Chung, J. R. Juan, A.M. Robertson, et. al., "Prevalence and characteristics of calcification in human intracranial aneurysms", submitted in 2018.

6. J. Araneo, B. Chung, M. Cristaldi, A. Vaidya, R. Wulandana, "Experimental Control from Wake Induced Autorotation with Applications to Energy Harvesting", submitted in 2018.

## Papers in Preparation

1. B.J. Chung, A. Vaidya, "The role of mucus layer in human tear film subjected to eye blinking motion".

2. B.J. Chung, A.M. Robertson. "Mathematical modeling on the behavior of human arterial walls subjected to a pulsatile flow".

3. B.J. Chung, M. Karlson, B. Nita, A. Vaidya,"Numerical computations of vortex formation length in flow past an elliptical cylinder".

## Conference Abstracts

1. B. Chung, A. M. Robertson, "A Novel flow chamber to evaluate endothelial cell response to flow at arterial bifurcations", *Proceedings of the Biomedical Engineering Society (BMES)*, Nashville, Tennessee, October 2-4, 2003.

2. B. Chung, A. M. Robertson, "The numerical design of a parallel plate flow chamber for investigation of endothelial cell response to shear stress", *Proceedings of the Second M.I.T. Conference on Computational Fluid and Solid Mechanics*, June 17-20, 2003.

3. B. Chung, A. M. Robertson, "Exploration of hemodynamic risk Factors for cerebral aneurysms", *Workshop "Modeling and Simulation of Hemodynamics"*, Heidelberg, May 13-15, 2004.

4. B. Chung, L. Lee, Z. Lin, N, Martinsen-Burrel, R. McLaughlin, R. Camassa, H. Salman, "Evolution of initial random fields by deterministic flows in passive scalar transport", *Cha-Cha Days Workshop, National Institute of Aerospace*, Hampton, VA, Oct 19-21, 2007.

5. D. Castillo, K.S orriano, B. Chung, K.S chnitzer, A. Vaidya, "Metastable states in terminal orientation of symmetric bodies in a flow", *Garden State LSAMP Conference*, 2014.

6. K. AlMuhanna, B.J. Chung, M.M. Hossain, L. Zhao, J.R. Cebral, B. K Lal, S. Sikdar, "Robustness of estimating hemodynamics around carotid artery plaques using computational fluid dynamics and 3D ultrasound imaging", *Ultrasonic Imaging and Tissue Characterization Symposium*, Arlington, VA, June 22-25, 2015.

7. X. Duan, B.J. Chung, J.R. Cebral, K. Aziz, A.M. Robertson, "Effective Remodeling in Cerebral Aneurysm: a Case Study", *2015 Summer Biomechanics, Bioengineering and Biotransport Conference*, Snowbird, Utah, June 17-20, 2015.

8.  X. Duan, A.M. Robertson, B.J. Chung, K. Aziz, J. Cebral, "Variation in Collagen Architecture Remodelling and Wall Mechanics in Unruptured Intracranial Aneurysms", *Modelling and Simulation of Aneurysm Mechanics, 9th European Solid Mechanics Conference*, Madrid, July 6-10, 2015.
9.  J. Cebral, X. Duan, B.J. Chung, C. Putman, K. Aziz, A.M. Robertson, "Studying Local Hemodynamics and Wall Properties in Intracranial Aneurysms, *Modelling and Simulation of Aneurysm Mechanics, 9th European Solid Mechanics Conference*, Madrid, July 6-10, 2015.
10. B. Chung, B. Ortega, A. Vaidya, "Entropy production for the terminal orientation of a half cylinder in a flow", *2nd International Electronic Conference on Entropy and Its Applications*, November 15-30, 2015.
11. D. Castillo, K. Sorriano, B. Chung, K. Schnitzer, H. Su, A. Vaidya, "Metastable states in terminal orientation of symmetric bodies in a flow", *68th Annual Division of Fluid Dynamics Meeting*, American Physical Society, Pittsburgh, November 22-25, 2015.
12. J. Cebral, E. Ollikainen, B. Chung, F. Mut, V. Sippola, B.R. Jahromi, R. Tulamo, J. Hernesniemi, M. Niemela, A. Robertson, J. Frosen, "Intrasaccular hemodynamics, wall inflammation and degenerative changes of cerebral aneurysm wall", *Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C)*, Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.
13. B. Chung, R. Doddasomayajula, F. Mut, F. Hamzei-Sichani, C.M. Putman, M. Pritz, C.M. Jimenez, J. Cebral, "PCOM aneurysms: angio-architecture, hemodynamics and geometry, Poster *Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C)*, Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.
14. R. Doddasomayajula, B. Chung, F. Hamzei-Sichani, C. M. Putman, J.R. Cebral, "Comparison of flow conditions in aneurysms at the basilar tip and internal carotid artery terminus", *Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C)*, Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.
15. J.R. Cebral, B. Chung, F. Mut, F. Nijnatten, D. Ruijters, "Comparison of cerebral aneurysm flow fields obtained from CFD and DSA", *Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C)*, Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.

## TALKS / PRESENTATIONS

1.  *A Novel Flow Chamber to Evaluate Endothelial Cell Response to Flow at Arterial Bifurcations,* 2003 Fall Meeting of the Biomedical Engineering Society (BMES), Nashville, Tennessee, October 2-4, 2003.
2.  *The Numerical Design of a Parallel Plate Flow Chamber for Investigation of Endothelial Cell Response to Shear Stress*, Second M.I.T. Conference on Computational Fluid and Solid Mechanics, June, 17-20, 2003.
3.  *A Novel Flow Chamber for Investigating Endothelial Cell Response to Mechanical Stimuli and its Role in Aneurysm Formation,* Contemporary Challenges in Applied Fluid Dynamics, CapoMiseno, 05/31-06/05, 2001.
4.  *Exploration of Hemodynamic Risk Factors for Cerebral Aneurysms,* Workshop "Modeling and Simulation of Hemodynamics",* Heidelberg, May 13-15, 2004.
5.  *Evolution of initial random fields by deterministic flows in passive scalar transport,* Cha-Cha Days Workshop, National Institute of Aerospace, Hampton, VA, Oct 19-21, 2007.
6.  *Oscillations and Autorotation***,** Cha-Cha Days Workshop, University of North Carolina -Chapel Hill, Chapel Hill, NC, October, 2008.
7.  *Vortex Induced Oscillations of Cylinders at Intermediate Reynolds Numbers,* American Physical Society, 60th Annual Meeting of the Division of Fluid Dynamics, November 18-20, 2007, abstract #JU.028.
8.  *Computational Fluid Dynamics of Red Blood Cell Aggregation in Microcirculation,* School of Engineering, Grand Valley State University, February 20, 2009.
9.  *Computational Fluid Dynamics of Red Blood Cell Aggregation in Microcirculation,* Department of Engineering Technology, College of Technology, University of Houston, April 20, 2009.
10. *Wake induced oscillations at low and intermediate Reynolds number/Fluid mechanics of the eye*, ASME 2010 Joint US-European Fluids Engineering Meeting, Montreal, Canada, August 2-5, 2010.
11. *Wake Induced Oscillations of Finite Cylinders,* 47th Annual Meeting of Society of Engineering Science, Iowa State University, Ames, Iowa, October 4-6, 2010.
12. *Application of Computational Fluid Dynamics to Bio & Geo Physics*, L3-Communications, San Diego, CA, December 5, 2012.
13. *Metastable States in Terminal Orientation of Symmetric Bodies in a Flow*, Garden State LSAMP Conference, 2014. (Poster). Students won third place in the poster contest.
14. *Robustness of Estimating Hemodynamics around Carotid Artery Plaques using Computational Fluid Dynamics and 3D*

*Ultrasound Imaging*, Ultrasonic Imaging and Tissue Characterization Symposium, Arlington, VA, June 22-25, 2015.

15. *Effective Remodeling in Cerebral Aneurism: a Case Study*, 2015 Summer Biomechanics, Bioengineering and Biotransport Conference, Snowbird, Utah, June 17-20, 2015.
16. *Variation in Collagen Architecture Remodelling and Wall Mechanics in Unruptured Intracranial Aneurysms*, Modelling and Simulation of Aneurysm Mechanics, 9th European Solid Mechanics Conference, Madrid, July 6-10, 2015.
17. *Studying Local Hemodynamics and Wall Properties in Intracranial Aneurysms*, Modelling and Simulation of Aneurysm Mechanics, 9th European Solid Mechanics Conference, Madrid, July 6-10, 2015.
18. *The Role of the Mucus Layer in the Tear Film*, Multiscale Modeling of Macromolecular Systems at the 2015 Combined Southwest Region Meeting and the Southeastern Regional Meeting of the American Chemical Society, November 4-7, 2015.
19. *Entropy Production for the Terminal Orientation of a Half Cylinder in a Flow*, 2nd International Electronic Conference on Entropy and Its Applications, November 15-30, 2015.
20. *Metastable States in Terminal Orientation of Symmetric Bodies in a Flow*, 68th Annual Division of Fluid Dynamics Meeting, American Physical Society, Pittsburgh, November 22-25, 2015.
21. *Intrasaccular hemodynamics, wall inflammation and degenerative changes of cerebral aneurysm wall*, Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C), Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.
22. *PCOM aneurysms: angio-architecture, hemodynamics and geometry*, Poster, Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C), Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.
23. *Comparison of flow conditions in aneurysms at the basilar tip and internal carotid artery terminus*", Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C), Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.
24. *Comparison of cerebral aneurysm flow fields obtained from CFD and DSA,* Summer Bioengineering, Biomechanics and Biotransport Conference (SB3C), Gaylord National Resort & Convention Center National Harbor, Maryland, June 29-July 2, 2016.
25. *CFD Study for Risk Factors of Cerebral Aneurysm Rupture,* College of Information Technology and Engineering, Marshall University, November 7, 2016.
26. *CFD Study for Risk Factors of Cerebral Aneurysm Rupture and its Treatment,* Department of Mechanical Engineering, Virginia Commonwealth University, November 22, 2016.
27. *Computational Fluid Dynamics of Cerebral Aneurysm,* Department of Mathematical Sciences, Montclair State University, January 29, 2018.
28. *Computational Fluid Dynamics of Cerebral Aneurysm,* Department of Mechanical Engineering, Rowan University, February 6, 2018.

## WORKSHOPS

1. Participant learning the basic functionality of the ADINA at ADINA R&D in MA, May 2-5, 2000.
2. Participant at the International school on Biomathematics, Bioengineering and Clinical Aspects of Blood Flow, Mathematical Sciences Research Institute (MSRI), Berkeley, California, 07/23/02-08/09/02.
3. Participant at the Institute for Computational and Experimental Research in Mathematics, (ICERM), Brown University, "From the Clinic to Partial Differential Equations and Back: Emerging challenges for Cardiovascular Mathematics", Providence, RI, 01/20/14-01/24/14.

## EVENTS ORGANIZED

1. Scientific Committee Member for the 4th International Conference on Computational Data Analysis and Numerical Methods, October 2017, Beja Polytechical Institute, Portugal.

## GRANT WRITING

Consultant: *Non-equilibrium Thermodynamics and Pattern Formation*, Montclair State University, MSU Separately Budgeted Research Proposal 2015, $4,000 funded.

## REVIEW WORK

*Journal of Biomechanics, International Journal for Numerical Methods in Biomedical Engineering, International Journal of Applied Math and Statistics, Applied Mathematics and Computation, PLOS Computational Biology, Computational and Applied Mathematics*

## COMPUTER SKILLS

**Computer Languages**:  FORTRAN, C, C++, Matlab, Message Passing Interface (MPI)
**Symbolic Simulator**:  Mathematica, Macsyma, Maple
**Finite Element Package**s:   ADINA, ANSYS, FLUENT, COMSOL
**CAD Software:**   Pro/Engineer, SolidWorks, GAMBIT, Freecad
**Medical Image Segmentation**: VMTK, ITK-SNAP
**CFD Methods**:   Finite Volume Method, Finite Element Method, Arbitrary Lagrangian Eulerian Method (ALE), Chimera Grids, Immersed Boundary Method (IB), Large Eddy Simulation (LES)
**Operating Systems:**   MS-DOS, Unix
**Languages:**   English, Korean