

Curriculum Vitae

Seungik Baek, Ph. D.

Assistant Professor
Department of Mechanical Engineering
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Michigan State University
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Personal Data

Date of Birth : March 9, 1971
Nationality : Korean

Research Interests

Biomedical engineering, cardiovascular mechanics, biomaterials, intracranial aneurysms, thermal therapies, biomechanics

Education

Post-Doc.	2003~2006	Texas A&M University, Biomedical Engineering
Ph.D.	1998~2003	Texas A&M University, Mechanical Engineering
B.S.	1989~1996	Seoul National University in Korea Biosystem Engineering

Other Experience

1996-1997	Engineer, Hyundai KEFICO, Korea Production line of automobile fuel injectors
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Teaching Experience

Courses (at Michigan State University)

- ME828: Advanced Strength of Materials (Spring 2007)
- ME222: Mechanics of Deformable Solid (Fall 2007)

Academic advising for a design team (ME481, at MSU)

- “Braking system for a hospital bed” sponsored by Stryker Medical (Spring 2007; won the 3rd place among 22 teams)

Teaching assistant (2000~2003, at Texas A&M University)

- Engineering dynamics, Theory of elasticity, Material science

Professional Society

Member, Biomedical Engineering Society (BMES)	2005~present
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Member, American Society of Mechanical Engineers (ASME) 2006~present
Member, American Society of Engineering Education (ASEE) 2006~present

Ph.D. Students:

Jungsil Kim
Shahrokh Zeinali

MS Students:

William Smits (co-advising with Prof. Choi)
Azadeh Sheidaei (summer intern, 2008)
Emily Alicia Wandell (summer intern, 2007)

Undergraduate Research Students:

Megan Galdes (2006~2007), Nicholas Beechnau (2007~2008), Jane Kang (visiting student, 2007),
Nicole Arnold (summer intern, 2007), Stanley Christopher Hunley (summer intern, 2008), Micheal
Mcphail (summer intern, 2008)

MS Thesis Committee:

Wei, Feng (MS, 2008), Monroe, Ryan (MS, 2008), Rosario, Kirit (MS, 2008), Manorama,
Abinand (MS, 2008), Rampurawala, Zahid (MS, 2008)

Awards and Fellowships

1. MSU Intramural Research Grants Program (IRGP) Award 2007

Journal Publications

1. S. Baek, K.R. Rajagopal and A.R. Srinivasa, *Measurements related to the flow of granular material in a torsional rheometer*, Particular Science and Technology, Vol 19, pp. 175, 2001.
2. S. Baek and A.R. Srinivasa, *A variational procedure utilizing the assumption of maximum dissipation rate for gradient-dependent elastic-plastic materials*, International Journal of Non-linear Mechanics, Vol 38, pp. 659-662, 2003.
3. S. Baek and A.R. Srinivasa, *Thermomechanical constraints and constitutive formulations in thermoelasticity*, Mathematical Problems in Engineering, Vol 3, pp. 153-171, 2003
4. S. Baek and A.R. Srinivasa, *Diffusion of a fluid through an elastic solid*, International Journal of Non-Linear Mechanics, Vol 39, pp. 201-218, 2004
5. S. Baek and A.R. Srinivasa, *Modeling of the pH-sensitive behavior of an ionic gel in the presence of diffusion*, International Journal of Non-Linear Mechanics, Vol 39, pp. 1301-1318, 2004
6. P.B. Wells, S. Thomsen, M.A. Jones, S. Baek, and J.D. Humphrey, *Histological evidence for the role of mechanical stress in modulating thermal denaturation of collagen*, Biomechanics and Modeling in Mechanobiology, Vol 4, pp. 201-210, 2005
7. S. Baek, P.B. Wells, K.R. Rajagopal and J.D. Humphrey, *Heat-induced changes in the finite*

- strain viscoelastic behavior of a collagenous tissue*, ASME Journal of Biomechanical Engineering, Vol 127, pp. 580-586, 2005
8. S. Baek, K.R. Rajagopal and J.D. Humphrey, *Competition between radial expansion and thickening in the enlargement of an intracranial saccular aneurysm*, Journal of Elasticity, Vol 80, pp. 13-31, 2005
 9. U. Saravanan, S. Baek, K.R. Rajagopal and J.D. Humphrey, *On the deformation of the circumflex coronary artery during inflation tests at constant length*, Experimental Mechanics, Vol 46, pp. 647-656, 2006
 10. S. Baek, K.R. Rajagopal and J.D. Humphrey, *A theoretical model of enlarging intracranial fusiform aneurysms*, ASME Journal of Biomechanical Engineering, Vol 128, pp. 142-149, 2006
 11. S. Baek, R.L. Gleason, K.R. Rajagopal and J.D. Humphrey, *Theory of small and large: Possible utility for computations of fluid-solid interactions in arteries*, Computer Methods in Applied Mechanics and Engineering, Vol 196, pp. 3070-3078, 2007
 12. J-J. Hu, S. Baek and J.D. Humphrey, *Stress-strain behavior of the passive basilar artery in normotension and hypertension*, Journal of Biomechanics, Vol 40, pp. 2559-2563, 2007
 13. J.D. Humphrey, S. Baek, and L.E. Niklason, *Biochemomechanics of cerebral vasospasm and its resolution: I. A new hypothesis and theoretical framework*, Annals of Biomedical Engineering, Vol 35, pp. 1485-1497, 2007
 14. S. Baek, A. Valentin and J.D. Humphrey, *Biochemomechanics of cerebral vasospasm and its resolution: II. Constitutive relations and model simulations*, Annals of Biomedical Engineering, Vol 35, pp. 1498-1509, 2007
 15. J.D. Humphrey, P.B. Wells, S. Baek, A. Lai, K. McLerod and A. Yeh, *A theoretically-motivated biaxial tissue culture system with intravital microscopy*, Biomechanics and Modeling in Mechanobiology, in print, 2008
 16. A. Valentin, L. Cardamone, S. Baek, and J.D. Humphrey, *Complementary vasoactivity and matrix remodeling in arterial adaptations to altered flow and pressure*, Journal of the Royal Society interface, accepted for publication
 17. C.A. Figueroa, S. Baek, C.A. Taylor, J.D. Humphrey, *A computational framework for fluid-solid-growth modeling in cardiovascular simulations*, Computer Methods in Applied Mechanics and Engineering, accepted for publication
 18. Seungik Baek and Thomas J. Pence, *On swelling induced degradation of fiber reinforced polymers*, International Journal of Engineering Science, submitted
 19. S. Zeinali, J. Choi and S. Baek, *On parameter estimation for biaxial mechanical behavior of arteries*, Journal of Biomechanics, in preparation
 20. S. Baek and J. Kim, *Effect of surrounding tissues in vascular adaptation: Theoretical study*,

Biomechanics and Modeling in Mechanobiology, in preparation

21. A. Sheidaei, S.C. Hunley, L.G. Raguin, and S. Baek, *Toward patient-specific modeling of vascular adaptation*, International Journal of Experimental and Computational Biomechanics, in preparation

Book Chapters

1. S. Baek, K.R. Rajagopal and J.D. Humphrey, *Ch.3: Theoretical modeling of enlarging intracranial aneurysms*, In: Modeling of Biological Materials (F. Mollica, L. Preziosi, and K.R. Rajagopal eds.), Springer Verlag, 2007

Conference Proceedings and Abstracts

1. S. Baek, K.R. Rajagopal and J.D. Humphrey, *Growth and remodeling of a sub-class of intracranial saccular aneurysm*, Presented at BMES Conference, Philadelphia, 2004

2. S. Baek, K.R. Rajagopal and J.D. Humphrey, *Modeling of enlarging intracranial aneurysms induced by stress-mediated growth and remodeling*, Presented at BMES Conference, Baltimore, 2005

3. S. Baek, C.A. Figueroa, C.A. Taylor and J.D. Humphrey, *Towards patient-specific modeling – II Biomechanics of a growing aneurysm*, Proceedings of SPIE, Vol 6143, Medical Imaging 2006: Physiology, Function, and Structure from Medical Images, Armando Manduca, Amir A. Amini, Editors, 61432c, 2006

4. C.A. Figueroa, S. Baek, I.E. Vignon-Clementel, J.D. Humphrey, and C.A. Taylor, *Towards patient-specific modeling – I. Hemodynamics in a growing aneurysm*, Proceedings of SPIE, Vol 6143, Medical Imaging 2006: Physiology, Function, and Structure from Medical Images, Armando Manduca, Amir A. Amini, Editors, 61430k, 2006

5. J.D. Humphrey, S. Baek, and K.R. Rajagopal, *Keynote: Growth and stability of cerebral aneurysm*, Presented at The Fifth World Congress of Biomechanics, Munich Germany, 2006. Journal of Biomechanics, Vol 39, Supplement 1, pp. S326, 2006

6. J.D. Humphrey, S. Baek, and L.E. Niklason, *Biomechanics of cerebral vasospasm*, Presented at The Fifth World Congress of Biomechanics, Munich Germany, 2006

7. S. Baek, R.L. Gleason, W. Dye, E. Wilson, and J.D. Humphrey, *Biomechanical properties of carotid arteries from wild-type mice and dystrophin and sarcoglycan- δ knockout mice*, Presented at The Fifth World Congress of Biomechanics, Munich Germany, 2006. Journal of Biomechanics, Vol 39, Supplement 1, pp. S322, 2006

8. C. Alberto Figueroa, Seungik Baek, Jay D. Humphrey, and Charles A. Taylor, *Incorporating the effects of variable wall properties in large-scale deformable models of the cardiovascular system*, Proceedings of the ASME 2007 Summer Bioengineering Conference, June 20-24, Keystone Colorado, 2007

9. S. Baek, C.A. Figueroa, C.A. Taylor, and J.D. Humphrey, *Biomechanics of enlarging intracranial aneurysms toward patient specific modeling*, the 9th U.S. National Congress on Computational Mechanics, July 22-26, San Francisco, 2007
10. C. Alberto Figueroa, Seungik Baek, Jay D. Humphrey, Charles A. Taylor, *Keynote: Blood flow in compliant vascular models: Biomechanics of an enlarging intracranial aneurysm*, the 9th U.S. National Congress on Computational Mechanics, July 22-26, San Francisco, 2007
11. J.D. Humphrey, S. Baek, and A. Valentin, *Biochemomechanics of cerebral vasospasm and its resolution*, the 9th U.S. National Congress on Computational Mechanics, July 22-26, San Francisco, 2007
12. S. Baek, K.R. Rajagopal, and J.D. Humphrey, *Modeling and numerical simulations of growth and remodeling of intracranial aneurysms*, Special Symposium of “Biomechanics of Growth and Remodeling” at the 44th Annual Technical Meeting of the Society of Engineering Science (SES), October 22-24, Texas A&M University, 2007
13. A. Valentin, S. Baek, and J.D. Humphrey, *Biomechanics of cerebral vasospasm and resolution*, Special Symposium of “Solid-Fluid Interactions in Biomechanics” at the 44th Annual Technical Meeting of the Society of Engineering Science (SES), October 22-24, Texas A&M University, 2007
14. E. Wandell, N. Beechnau, W. Smits, S. Baek, J. Choi, M. de Zee, T.R. Bush, *Computer model analysis of cervical lateral function for symmetric and asymmetric/symptomatic subject groups*, Program Book with Abstract, World Congress on Neck Pain, January 20-22, Los Angeles CA, 2008
15. C. Alberto Figueroa, Seungik Baek, Charles A. Taylor, Jay D. Humphrey, *A fluid-solid growth framework for multi-scale modeling of vascular structure*, The 5th International Bio-fluid Symposium and Workshop, March 28-30, Pasadena, CA, 2008
16. Shahrokh Zeinali, Jongeun Choi, Seungik Baek, *Parameter estimation of mechanical behavior of the artery using a nonlinear least square method with a noise model*, Proceedings of the ASME Summer Bioengineering Conference, June 25-29, Marco Island, FL, 2008
17. Seungik baek, C. Alberto Figueroa, Charles A. Taylor, Jay D. Humphrey, *A framework for fluid-solid-growth modeling and its application to understanding the enlargement of a fusiform aneurysm*, Proceedings of the ASME Summer Bioengineering Conference, June 25-29, Marco Island, FL, 2008

18. C. Alberto Figueroa, Seungik Baek, Charles A. Taylor, Jay D. Humphrey, *Multi-scale modeling of blood vessels using a Fluid-Solid Growth framework*, The 8th World Congress on Computational Mechanics, June 30-July 5, Venice, Italy, 2008

19. Abinand Anbazhagan Manorama, Seungik Baek, Tamara Reid Bush, *Blood flow and oxygen level characterization of the forearm with changes in normal and shear load*, North American Congress on Biomechanics, August 5-9, Ann Arbor, Michigan, 2008

Presentations without Proceedings

1. *Soft tissue mechanics and biological materials*, Department of Biosystem Engineering Seminar, Seoul National University, Seoul Korea, 2004

2. *Two problems in the biomechanics of soft tissues: Thermomechanics and growth*, Department of Mechanical Engineering Seminar, Michigan State University, 2006

3. *Biomechanics of cerebral aneurysms and vasospasms*, MSU Biomedical Engineering Society, Michigan State University, March 15, 2007

4. *Constitutive modeling of biological tissues and computational simulations of aneurysm growth*, Korea Research Institute of Standards and Science (KRISS), South Korea, April 29, 2008

Member of Editorial Board

International Journal of Experimental and Computational Biomechanics

Reviewer for 9 Engineering Journals

Biomechanics and Modeling in Mechanobiology

Annals of Biomedical Engineering

Theoretical and Computational Fluid Mechanics

Biomedical Engineering Online

Continuum Mechanics and Thermodynamics

ASME Journal of Biomechanical Engineering

International Journal of Engineering Science

Computer Methods in Applied Mechanics and Engineering

Journal of the Royal Society Interface