J. Patrick Wilber

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Research Areas

- Modeling and Analysis of Problems in Solid Mechanics and Mathematical Biology

Positions Held

- Associate Professor, Department of Theoretical and Applied Mathematics, University of Akron, May 2008 to Present.
- Assistant Professor, Department of Theoretical and Applied Mathematics, University of Akron, August 2002 to May 2008.
- VIGRE Assistant Professor, Department of Mathematics, Texas A&M University, January 2001 to June 2002.
- Visiting Assistant Professor, Department of Mathematics, Texas A&M University, September 1999 to December 2000.

Education

- Ph.D. in Applied Mathematics, University of Maryland at College Park, May 1999.
  Adviser: Stuart S. Antman.
- M.A. in Political Science, University of Maryland at College Park, December 1993.
- B.A. in International Relations, Magna Cum Laude, University of Notre Dame, May 1989.

Publications

- J.K. Miller, R. Neubig, C. Clemons, K.L. Kreider, J.P. Wilber, G. Young, A.J. Ditto, Y.H. Yun, A. Milsted, H.T. Badawy, M.J. Panzer, W.J. Youngs, C.L. Cannon, Nanoparticle Deposition onto Biofilms, Submitted, *Annals of Biomedical Engineering*, 2012.
- J.K. Miller, H.T. Badawy, C. Clemons, K.L. Kreider, J.P. Wilber, A. Milsted, G. Young, Development of the *Pseudomonas aeruginosa* Mushroom Morphology and Cavity Formation by Iron-starvation: a Mathematical Modeling Study, Submitted, *Journal of Theoretical Biology*, 2012.
- S.D. Ryan, D. Golovaty, J.P. Wilber, An Elastica Model of the Buckling of a Nanoscale Sheet Perpendicular to a Rigid Substrate, Submitted, *International Journal of Solids and Structures*, 2012.
- M.W. Roberts, A. Buldum, C. Clemons, D. Quinn, J.P. Wilber, and G. Young, Continuum Plate Theory and Atomistic Modeling to Find the Flexural Rigidity of a Graphene Sheet Interacting with a Substrate, *Journal of Nanotechnology*, 2010:868492, 2010.
- J.P. Wilber, Buckling of Graphene Layers Supported by Rigid Substrates, *Journal of Computational and Theoretical Nanoscience*, 7:2338–2348, 2010.
- S.S. Antman and J.P. Wilber, The Asymptotic Problem for the Springlike Motion of a Heavy Piston in a Viscous Gas, *Quarterly of Applied Mathematics*, 65:471–498, 2007.

- D. Quinn, J.P. Wilber, C. Clemons, G. Young, and A. Buldum, Buckling Instabilities in Coupled Nano-Layers, *International Journal of Non-Linear Mechanics*, 42:681–689, 2007.
- J.P. Wilber, A. Buldum, C. Clemons, D. Quinn, and G. Young, Continuum and Atomistic Modeling of Interacting Graphene Layers, *Physical Review B*, 75:045418, 2007.
- J.P. Wilber, Invariant Manifolds Describing the Dynamics of a Hyperbolic-Parabolic Equation from Nonlinear Viscoelasticity, *Dynamical Systems, An International Journal*, 21:465–490, 2006.
- J.P. Wilber and J. Criscione, The Baker-Ericksen Inequalities for Hyperelastic Models Using a Novel Set of Invariants of Hencky Strain, *International Journal of Solids and Structures*, 42:1547–1559, 2005.
- J.P. Wilber and J.R. Walton, Deformations of a Neo-Hookean Elastic Wedge Revisited, *Mathematics and Mechanics of Solids*, 9:307–322, 2004.
- J.P. Wilber, Absorbing Balls for Equations Modeling Nonuniform Deformable Bodies with Heavy Rigid Attachments, *Journal of Dynamics and Differential Equations*, 14:855–887, 2002.
- J.P. Wilber and J.R. Walton, The Convexity Properties of a Class of Constitutive Models for Biological Soft Tissues, *Mathematics and Mechanics of Solids*, 7:217–236, 2002.
- J.P. Wilber and J.R. Walton, Sufficient Conditions for Strong Ellipticity for a Class of Anisotropic Materials, *International Journal of Non-Linear Mechanics*, 38: 441-455, 2002.
- J.P. Wilber and S.S. Antman, Global Attractors for Degenerate Partial Differential Equations from Nonlinear Viscoelasticity, *Physica D*, 150: 177–206, 2001.

Refereed Conference Proceedings

- J. Leta and J.P. Wilber, An Elastica Model that Describes the Buckling of the Cross-section of a Nanotube Interacting with a Rigid Ring, *Proceedings of 16th US National Congress of Theoretical and Applied Mechanics, 2010.*
- J. Gallagher, Y. Milman, S. Ryan, D.G. Golovaty, J.P. Wilber, and A. Buldum, A Buckling Problem for Graphene Sheets, *Proceedings of CMDS 11, the 11th International Symposium on Continuum Models and Discrete Systems, 2007.*
- D.D. Quinn, A. Bolden-Pudlosky, A. Buldum, C. Clemons, J.P. Wilber, and G. Young, Buckling of Coupled Beams, *Proceedings of ENOC2005, the Fifth EUROMECH Nonlinear Dynamics Conference, 2005.*
- J.P. Wilber, D.D. Quinn, A. Bolden-Pudlosky, A. Buldum, C. Clemons, and G. Young, Buckling Instabilities in Coupled Nanobeams, *Proceedings of IMECE 2005, International Mechanical Engineering Congress and Exposition, 2005.*

External Funding

- $270,000, NSF Grant, Co-PI with D. Golovaty, *Modeling of nonbonded interactions in graphene and carbon nanotubes*, DMS-1009849, July 2010 to June 2013.
- $198,000, Supplement to NIH ROI GM086895-01. August 2010 to July 2011.
- $975,000 NIH Grant, Senior Personnel with PI G. Young and with C. Cannon, C. Clemons, D. Ely, S. Lopina, A. Milsted, W. Youngs, Y.Yun, A. Buldum, and J. Leid. *Polymeric Drug Delivery Systems and Biofilms in the Lung*, NIH GM86895-01, August 2008 to July 2012.

- $267,935 NSF Grant, PI with co-PIs A. Buldum. D. Golovaty, D. Quinn, and G. Young, *Modeling, Analysis, and Simulation of Bending Nanotubes*, DMS-0407361, July 2004 to December 2008..
- $6,250 NSF REU Supplement to *Modeling, Analysis, and Simulation of Bending Nanotubes*, DMS-0407361-001, 2006.

Internal Grants

- $6,000, Faculty Academic Year Grant, (with C. Clemons and G. Young), University of Akron, 2007-08.
- $8,000 Integrated Bioscience Collaborative Research Incentive Grant, (with C. Clemons, A. Milsted, G. Young), University of Akron, Summer 2007.
- $8,000 Summer Faculty Research Grant, University of Akron, Summer 2003.

Awards

- Selected as *Outstanding Young Researcher* for Redraider Minisymposium on Novel Materials and Structures, Texas Tech University, November 2006.
- Received Buchtel College of Arts and Sciences Chairs' Outstanding Achievement Award for Early Career, University of Akron, 2005.
- Received College of Computer, Mathematical, and Physical Sciences Senior Teaching Associate Award, University of Maryland, Fall 1998.

Some Recent Presentations

- Contributing Speaker, *48th Annual Meeting of the Society of Engineering Science: Session on Nanoscale Mechanics*, October 2011.
- Invited Speaker, *University of Akron Third Annual Silver Center Meeting*, July 2010.
- Contributing Speaker, *SIAM Life Sciences Conferences 2010*, July 2010.
- Contributing Speaker, *USNCTAM 2010: Session on Mechanics of Carbon Nanotubes*, June 2010.
- Contributing Speaker, *The 2009 Joint ASCE-ASME-SES Conference on Mechanics and Materials: Session on Material Instabilities*, June 2009.
- Contributing Speaker, *45th Annual Meeting of the Society of Engineering Science: Session on Multiscale Modeling*, October 2008.
- Contributing Speaker, *7th International Conference on Dynamical Systems and Differential Equations: Session on Applications of Differential Equations*, May 2008.
- Invited Speaker, University of Akron, Department of Polymer Engineering Weekly Seminar, February 2008.

Graduate Students

- Masters Thesis Adviser, Ross Bagwell, Applied Mathematics, Current.
- Masters Thesis Adviser, Fang Fang, Applied Mathematics, Current.
- Masters Thesis Adviser, Kevin Buckman, Applied Mathematics, Current.
- Masters Thesis Adviser, Dan Youhon, Applied Mathematics, Current.

- Masters Thesis Adviser, James Leto, Applied Mathematics, Current.
- Masters Thesis Adviser, Jay Adams, Applied Mathematics, MIA.
- Masters Thesis Co-Adviser, Dan Musser, Applied Mathematics, Finished July 2010.
- Masters Thesis Adviser, Pam Robinson, Applied Mathematics, Finished December 2009.
- Masters Thesis Co-Adviser, Shawn Ryan, Applied Mathematics, Finished May 2009.
- Masters Thesis Adviser, Andrew Mykrantz, Applied Mathematics, Finished May 2008.
- Masters Thesis Adviser, Scott Kaschner, Mathematics, Finished May 2008.
- Masters Thesis Co-Advisor, Mark Roberts, Applied Mathematics, Finished May 2007.