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Education

Ph.D., Purdue University, 2009.

M.S. Mechanical Engineering, Texas Tech University, 2004.

B.S. Mechanical Engineering, *Cum Laude*, Texas Tech University, 2002.

Professional Appointments

Assistant Professor, Department of Mechanical Engineering,
The University of Texas at San Antonio,
August 2011–present.

Adjunct Associate Professor, Department of Mechanical Engineering,
The University of New Mexico,
August 2010–December 2010.

Senior Member of the Technical Staff, Terminal Ballistics Technology Department,
Sandia National Laboratories, Albuquerque, NM,
January 2006–August 2011.

Member of the Technical Staff, Terminal Ballistics Technology Department,
Sandia National Laboratories, Albuquerque, NM,
August 2004–January 2006.

Awards & Honors

2013 Air Force Office of Scientific Research Young Investigator Award

Refereed Journal Articles

Published

1. R. Rahman, J.T. Foster, and A. Haque. Molecular dynamics simulation and characterization of graphene-cellulose nanocomposites. *The Journal of Physical Chemistry A*, 117(25):5344–5353, 2013. doi:10.1021/jp402814t.

2. J.T. Foster. Comments on the validity of test conditions in Kolsky bar experiments of elastic-brittle materials. *Experimental Mechanics*, 52(9):1559–1563, 2012. doi:10.1007/s11340-012-9592-6.
3. J.T. Foster, D.J. Frew, M.J. Forrestal, E.E. Nishida, and W. Chen. Shock testing accelerometers with a Hopkinson pressure bar. *International Journal of Impact Engineering*, 46:56–61, August 2012. doi:10.1016/j.ijimpeng.2012.02.006.
4. J.T. Foster, S.A. Silling, and W. Chen. An energy based failure criterion for use with peridynamic states. *International Journal of Multiscale Computational Engineering*, 9(6):675–688, 2011. doi:10.1615/IntJMultCompEng.2011002407.
5. J.T. Foster, W. Chen, and V.K. Luk. Dynamic crack initiation toughness of 4340 steel at constant loading rates. *Engineering Fracture Mechanics*, 78(6):1264 – 1276, 2011. doi:10.1016/j.engfracmech.2011.02.019.
6. J.T. Foster, S.A. Silling, and W.W. Chen. Viscoplasticity using peridynamics. *International Journal for Numerical Methods in Engineering*, 81(10):1242–1258, 2010. doi:10.1002/nme.2725.
7. J.T. Foster, A.A. Barhorst, C.N. Wong, and M.T. Bement. Modeling Loose Joints in Elastic Structures—Experimental Results and Validation. *Journal of Vibration and Control*, 15(4):549–565, 2009. doi:10.1177/1077546307082908.

Accepted

1. R. Rahman, J.T. Foster, and A. Haque. A multiscale modeling scheme based on peridynamic theory. *International Journal of Multiscale Computational Engineering*, Accepted, 2013.
2. E.E. Nishida, J.T. Foster, and P.E. Briseno. Constant-strain-rate testing of a G10 laminate composite through optimized Kolsky bar pulse shaping techniques. *Journal of Composite Materials*, Accepted, 2012. doi:10.1177/0021998312460263.

In Review

1. A. Katiyar, J.T. Foster, and M. Sharma. A peridynamic formulation of pressure driven convective fluid transport in porous media. *Journal of Computational Physics*, Submitted, 2013

In preparation

1. M.D Brothers, J.T. Foster, and H.R. Millwater. A comparison of different methods for calculating tangent-stiffness matrices in a massively parallel computational peridynamics code. *Computer Methods in Applied Mechanics and Engineering*, In preperation, 2103.
2. J.A. Mitchell and J.T. Foster. A nonlocal, ordinary, state-based plasticity model for peridynamics. *International Journal of Plasticity*, In preparation, 2013.

3. J.T. Foster, J.A. Mitchell, D.J. Littlewood, and M.L. Parks. A state-based isotropic hardening plasticity model for perodynamics. *International Journal of Plasticity*, In preparation, 2013.
4. J.R. York, J.T. Foster, E.E. Nishida, and B. Song. A novel torsional Kolksy bar for constant-strain-rate materials testing. *Experimental Mechanics*, In preparation, 2013.

Conference Proceedings

1. J.R. York, J.T. Foster, E.E. Nishida, and B. Song. A novel torsional Kolksy bar for constant-strain-rate materials testing. In B. Song, D. Casem, and J. Kimberly, editors, *Dynamic Behavior of Materials, Volume 1*, Conference Proceedings of the Society for Experimental Mechanics Series. Springer New York, 2013.
2. J.T. Foster and E.E. Nishida. *A priori* pulse shaper design for constant-strain-rate tests of elastic-brittle materials. In V. Chalivendra, B. Song, and D. Casem, editors, *Dynamic Behavior of Materials, Volume 1*, Conference Proceedings of the Society for Experimental Mechanics Series, pages 379–386. Springer New York, 2013. doi:10.1007/978-1-4614-4238-7_49.
3. J.T. Foster, D.J. Frew, M.J. Forrestal, E.E. Nishida, and W. Chen. Shock testing accelerometers with a Hopkinson pressure bar. *Experimental and Applied Mechanics, Volume 6*, pages 229–237, 2011. doi:10.1007/978-1-4614-0222-0_29.
4. J.T. Foster, W. Chen, and V.K. Luk. Dynamic fracture initiation toughness of high strength steel alloys. In *DYMAT 2009-9th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading*, volume 1, pages 407–412, 2009. doi:10.1051/dymat/2009058.
5. J.T. Foster, S.A. Silling, and W.W. Chen. State based peridynamic modeling of dynamic fracture. In *DYMAT 2009-9th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading*, volume 2, pages 1529–1535, 2009. doi:10.1051/dymat/2009216.
6. J.T. Foster, S.A. Silling, and W.W. Chen. State based peridynamic modeling of dynamic fracture. In *SEM 2009 Conference on Experimental and Applied Mechanics*, number 33. SEM, 2009.
7. J.T. Foster, V.K. Luk, and W. Chen. Dynamic initiation fracture toughness of high strength steel alloys. In *Proceedings of the XIth International Congress and Exposition. Orlando, Florida Society for Experimental Mechanics Inc*, volume 77, 2008.
8. D.A. Dederman, D. Burnett, J.T. Foster, and J.A. Dykes. In Situ Penetration Testing of Darts with 16-Inch Mobile Gas Gun. In *Proceedings of 24th International Symposium on Ballistics*, number TB149, 2008.

9. J.G. Averett, J.D. Cargile, J.T. Foster, and V.K. Luk. Oblique Perforation of Unreinforced Concrete Targets: Experiments and Numerical Simulations. In *Limited Proceedings of 77th Shock and Vibration Conference*, 2007.
10. J.G. Averett, J.D. Cargile, J.T. Foster, and V.K. Luk. Projectile Deceleration Due to Perforation Through Layers of Unreinforced Concrete Targets. In *Limited Proceedings of 76th Shock and Vibration Conference*, number U-045. SAVIAC, 2006.
11. J.T. Foster, A.A. Barhorst, C.N. Wong, and M.T. Bement. Modeling and Experimental Verification of Frictional Contact-Impact in Loose Bolted Joint Elastic Structures. In *Proceedings of IDETC'05*, number DETC2005-85465. IDETC, 2005.

Technical Reports

1. J.V. Cox, G.W. Wellman, J.M. Emery, J.T. Ostien, J.T. Foster, T.E. Cordova, T.B. Crenshaw, A. Mota, J.E. Bishop, S.A. Silling, D.J. Littlewood, J.W. Foulk III, K.J. Dowding, K. Dion, B.L. Boyce, J.H. Robbins, and B.W. Spencer. Ductile Failure X-prize. Technical Report SAND2011-6801, Sandia National Laboratories, 2012. doi:10.2172/1029764.
2. E.E. Nishida, J.T. Foster, E.W. Klamerus, and D. Burnett. Dynamic behavior of shock isolation/ mitigation materials by kolsky bar experiments. Technical Report SAND2011-8266, Sandia National Laboratories, 2011.
3. J.T. Foster, A.E. Fortier, J.G. Averett, J.D. Cargile, V.K. Luk, and D.A. Dederman. Predictive Simulation for Perforation Through Layers of Unreinforced Concrete Targets. Technical Report SAND2008-113, Sandia National Laboratories, 2008.
4. J.T. Foster, A.J. Webb, A.E. Fortier, V.K. Luk, and D.A. Dederman. Penetration Code Study for Angle-of-Obliquity (AoO) Experiments into High-Strength Concrete Targets. Technical Report SAND2008-1162, Sandia National Laboratories, 2008.
5. P.D. Coleman, R.A. Bates, M.T. Buttram, S.B. Dron, J.T. Foster, R.J. Franco, C.O. Landron, G.M. Loubriel, J.E. Lucero, A. Mar, T.L. Martinez, F.E. Reyes, and B.J. Welch. Void Sensor for Penetrators. Technical Report SAND2007-6528, Sandia National Laboratories, 2007.
6. R.J. Fogler, J.W. Giron, J.A. Jacob, W.P. Wolfe, R.W. Greene, R.D. Tucker, A.E. Fortier, J.T. Foster, D.M. Van Zuiden, W.T. O'Rourke, H.D. Nguyen, E. Ollila, and J.R. Phelan. Guided miniature air-deliverable sensor dart. Technical Report SAND2007-6528, Sandia National Laboratories, 2007.
7. J.T. Foster and A.J. Webb. Penetration Simulations for Angle-of-Attack (AoA) Experiments into Low Strength Concrete Targets. Sand2007-5256, Sandia National Laboratories, 2007.
8. J.A. Dykes and J.T. Foster. Discrete-ULL 1-C Final Test Report. Technical Report SAND2007-4273, Sandia National Laboratories, 2007.

9. J.T. Foster. Scale Modeling of Earth Penetrators for In Situ Targets. Technical Report SAND2006-4273, Sandia National Laboratories, 2006.

Technical Presentations

Conferences

“A non-local formulation for fluid flow and mass transport in porous media based on peridynamic theory”. (with A. Katiyar and M. Sharma). 12th US National Congress on Computational Mechanics. July 2013.

“A novel hierarchical multiscale modeling framework for polyethylene systems using Peridynamics and molecular dynamics”. (with R. Rahman). 2013 Mach Conference, Annapolis, MD. April 2013.

“Two-Dimensional Semi-Analytic Solutions to the Linearized State-Based Peridynamic Equilibrium Equation”. (with J.T. O’Grady). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

“A Peridynamics Based Hierarchical Multiscale Modeling Framework Between Continuum and Atomistic Scales”. (with R. Rahman, A. Haque). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

“Lessons Learned in Modeling Ductile Failure with Peridynamics”. (with D.J. Littlewood). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

“A Peridynamics Formulation of the Coupled Mechanics-Fluid Flow Problem”. (with A. Katiyar, H. Ouchi, M.M. Sharma). USACM Workshop on Nonlocal Damage and Failure: Peridynamics and other nonlocal methods. March 2013.

“Implicit time integration of an ordinary state-based peridynamic plasticity model with isotropic hardening.” (with D.J. Littlewood, J.A. Mitchell, M.L. Parks). ASME IMECE 2012. November 2012.

“Implicit time integration of an ordinary state-based peridynamic plasticity model with isotropic hardening.” (with D.J. Littlewood, J.A. Mitchell, M.L. Parks). SiViRT Simulation and Visualization Symposium. November 2012.

“Peridynamic Modeling of Localization in Ductile Metals.” (with D.J. Littlewood and B.L. Boyce) International Workshop on Computational Mechanics of Materials, IWCMM XXII. September 2012

“Viscoplasticity using peridynamics.” (with S.A. Silling and W. Chen) 10th US National Congress on Computational Mechanics. July 2009.

Student Delivered

“A complex-step method for tangent-stiffness calculation in a massively parallel computational peridynamics code.” (with M.D. Brothers and H.R. Millwater). 12th US National

Congress on Computational Mechanics. July 2013.

“Intragranular fracture and frictional effects in granular materials under pressure-shear loading.” (with A.M. Peterson and T.J. Vogler) 18th Biennial Intl. Conference of the APS Topical Group on Shock Compression of Condensed Matter held in conjunction with the 24th Biennial Intl. Conference of the Intl. Association for the Advancement of High Pressure Science and Technology (AIRAPT). July 2013.

Invited Talks

“Unifying the mechanics of continuous and discontinuous media.” Army Research Laboratory. February 2013.

“Unifying the mechanics of continuous and discontinuous media.” The Johns Hopkins University, Center for Advanced Ceramics and Metallic Systems. July 2012.

“Unifying the mechanics of continuous and discontinuous media.” Texas Tech University, Mechanical Engineering. April 2012.

“Hydraulic fracturing and its environmental impact: a short address of major public concerns.” Presentation for the Center for Simulation, Visualization, and Real-Time Prediction participation in UTSA Earthweek 2012. April 2012.

“Unifying the mechanics of continuous and discontinuous media.” 2011 International Workshop on Intensive Loading and its Effects. State Key Laboratory of Explosion Science and Technology, Beijing Institute of Technology. Beijing, China. December 2011.

“Peridynamic modeling of viscoplasticity and dynamic fracture.” University of Nebraska, Engineering Mechanics. April 2010.

“Peridynamic modeling of viscoplasticity and dynamic fracture.” University of New Mexico, Mechanical Engineering. February 2010.

Poster

“Intragranular fracture and frictional effects in granular materials under pressure-shear loading.” (with A.M. Peterson and T.J. Vogler) 18th Biennial Intl. Conference of the APS Topical Group on Shock Compression of Condensed Matter held in conjunction with the 24th Biennial Intl. Conference of the Intl. Association for the Advancement of High Pressure Science and Technology (AIRAPT). July 2013.

Grant Proposals

Funded

1. MURI Center for Material Failure Prediction Through Peridynamics. Air Force Office of Scientific Research, 2013-2018. ONRBAA12-020, Total Award \$7,500,000. Foster Award: \$959,153.

2. Predictive simulation of material failure using peridynamics-advanced constitutive modeling, verification, and validation. Air Force FY2013 Young Investigator Program. BAA-AFOSR-2012-0001, AFOSR, 2013-2015. \$360,000.
3. Statistical coarse-graining of molecular dynamics into peridynamics. Subaward from Army Research Laboratories Materials in Extreme Dynamic Environments Cooperative Research Agreement. The Johns Hopkins University, 2013. \$97,471.
4. Peridynamic simulation of pressure-shear experiments on granular media. Sandia National Laboratories, 2013. \$29,071
5. Statistical coarse-graining of molecular dynamics into peridynamics. Subaward from Army Research Laboratories Materials in Extreme Dynamic Environments Cooperative Research Agreement. The Johns Hopkins University, 2012. \$91,125.
6. Fracture Design, Placement And Sequencing In Horizontal Wells. Joint proposal with The University of Texas at Austin in response to solicitation number DE-FOA-0000724. DOE, 2012-2015. Total Award: \$1,592,451, Foster Award: \$275,250.
7. Application of Peridynamics to Hydraulic Fracture Modeling. The University of Texas at San Antonio – Office of the Vice President for Research, 2012. \$18,927.
8. Peridynamic Simulation of Granular Materials Undergoing Shock Compression. Sandia National Laboratories, 2012. \$32,597
9. Sandia X-Prize Necking Challenge. Sandia National Laboratories, 2012. \$44,700.

Pending

1. Fiber failure modeling with peridynamics. Submitted as subaward to Army Research Laboratories Materials in Extreme Dynamic Environments Cooperative Research Agreement. The Johns Hopkins University, 2014-2015. \$184,403.

Unfunded

1. BRIGE: A nonlocal mixture theory approach to fluid driven fracture with applications in energy production and environmental assessment. National Science Foundation, 2013-2015. Requested \$174,702.
2. Investigating Cellular And Subcellular Behaviors and Metabolic Mechanisms Using Thermal and Raman Imaging Techniques, National Science Foundation, 2013-2016. Co-PI Requesting: \$705,052
3. Dynamic Failure Mechanisms of Advanced Fiber Materials. Joint proposal with SwRI to the SwRI/UTSA CONNECT program, 2013. Requested \$99,940.
4. Towards exascale computational mechanics: exploiting the newest generation of heterogeneous HPC clusters. Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Award. Oak Ridge National Laboratories. Requesting: \$10,000.

5. DOE Career: Nonlocal porous flow in evolving fractured media using peridynamic theory. Department of Energy, 2013-2016. Requesting: \$749,875.
6. BRIGE: Identification and Simulation of Non-Local Effects to Improve Predictive Analysis of Heterogenous Materials. National Science Foundation, 2012-2014. Requested \$174,805.
7. Discontinuous Flow and Angled Localization: Modern Challenges in Material Failure. Joint proposal with SwRI to the SwRI/UTSA CONNECT program, 2012. Requested \$93,780.
8. A novel torsional Kolsky bar for testing materials at constant shear strain rates. Haythornthwaite Research Initiation Grant Program, 2011. Requested \$13,388.
9. Joint proposal with SwRI in response to BAA AFOSR 2011-06 on University Center of Excellence: High-rate Deformation Physics of Heterogeneous Materials. AFOSR, 2011. Total Proposed: \$5,000,000, Foster Requested: \$377,518.

Mentoring Activities

Graduate Students

1. Md. Imran Khan, M.S.M.E. *in progress*
2. Michael Brothers, M.S.M.E *in progress*
3. James O'Grady, Ph.D. *in progress*
UTSA COE Valero Competitive Research Scholar
4. Amanda Peterson, M.S.M.E *in progress*
5. Nikki Scott, M.S.M.E *in progress*
6. Arron Werthiem, M.S.M.E 2012 (KCI)
7. Jason York, M.S.M.E 2012, Ph.D. *in progress*
NSF Louis Stokes Allances for Minorty Participation (LSAMP) Fellow
UTSA COE Valero Competitive Research Scholar

Undergraduate Students (with financial support)

1. P. Eric Briseno, B.S.M.E. 2013
2. Robert Knobles
3. Robert Brothers

Graduate Commitee Member

Khaled Mahmud, Saurav Kumar, M.S.M.E. 2013

Miguel Cortina, Carlos Acosta, David Wagner, M.S.M.E 2012

Postdoctoral Researcher's Supported

1. Rezwanur Rahman, Ph.D.

Reviewer For

Journals

Int. Journal of Fracture, Applied Mathematics & Computation, Int. Journal of Impact Engineering, Engineering Fracture Mechanics, Experimental Mechanics, Review of Scientific Instruments, Int. Journal of Multiscale Computational Engineering, Int. Journal of Solids and Structures, CMC: Computers, Materials, & Continua, Journal of Mechanics of Materials and Structures.

Books

Split Hopkinson (Kolsky) Bar. W. Chen and B. Song. Springer 2010.

Organizations

Pi Tau Sigma - Mechanical Engineering Honor Fraternity, Tau Beta Pi - National Engineering Honor Society, American Society of Mechanical Engineers, American Institute of Aeronautics and Astronautics, Society for Experimental Mechanics – Dynamic Behavior of Materials Technical Division Committee Member, DYMAT, American Society for Engineering Education