

## TIMOTHY J. TRUSTER, Ph.D.

Assistant Professor    University of Tennessee – Dept. of Civil & Environmental Engineering  
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### EDUCATION

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN                      URBANA, IL  
*Doctor of Philosophy in Civil Engineering,*                      *May 2010 – May 2013*  
Dissertation Title: “A Variational Multiscale Computational Framework for Nonlinear  
Interfacial Solid Mechanics”  
*Master of Science in Civil Engineering*                      *Aug. 2008 – May 2010*

UNIVERSITY OF DAYTON                      DAYTON, OH  
*Bachelor of Civil Engineering*                      *Aug. 2004 – May 2008*

### APPOINTMENTS

University of Tennessee – Knoxville	Assistant Professor	2013 – Present
University of Illinois at Urbana-Champaign	Postdoctoral Researcher	2013
University of Illinois at Urbana-Champaign	Graduate Research Assistant	2008 – 2013

### PUBLICATIONS

#### REFEREED JOURNALS AND REVIEWED CONFERENCES

- [1] Truster T.J., Nassif O., Variational projection methods for gradient crystal plasticity using Lie algebras, *International Journal for Numerical Methods in Engineering*, DOI: 10.1002/nme.5355.
- [2] Truster T.J., Masud A., Discontinuous Galerkin method for frictional interface dynamics, *Journal of Engineering Mechanics*, DOI: 10.1061/(ASCE)EM.1943-7889.0001142.
- [3] Truster T.J., On interface element insertion into three-dimensional meshes, *Engineering Fracture Mechanics*, 153 (2016) 171–174.
- [4] Truster T.J., Discontinuous element insertion algorithm, *Finite Elements in Analysis and Design*, 2015; Submitted.
- [5] Truster T.J., A stabilized, symmetric Nitsche method for spatially localized plasticity, *Computational Mechanics*, 57 (2016) 75–103.
- [6] Truster T.J., Chen P., Masud A., On the algorithmic and implementational aspects of a discontinuous Galerkin method at finite strains, *Computers and Mathematics with Applications*, 70 (2015) 1266-1289.
- [7] Truster T.J., Chen P., Masud A., Finite strain primal interface formulation with consistently evolving stabilization, *International Journal for Numerical Methods in Engineering*, 102 (2015) 278-315.
- [8] Hlepas G., Truster T.J., Masud A., A heterogeneous modeling method for porous media flows, *International Journal for Numerical Methods in Fluids*, 75 (2014) 487-518.
- [9] Truster T.J., Masud A., Primal interface formulation for coupling multiple PDE: A consistent derivation through the variational multiscale method, *Computer Methods in Applied Mechanics and Engineering* 268 (2014) 194-224.

- [10] Masud A., Truster T.J., A framework for residual-based stabilization of incompressible finite elasticity: Stabilized formulations and F-bar methods for linear triangles and tetrahedra, *Computer Methods in Applied Mechanics and Engineering* 267 (2013) 359-399.
- [11] Truster T.J., Eriten M., Polycarpou A.A., Bergman L.A., Masud A., Stabilized interface methods for mechanical joints: Physics-based models and variationally consistent embedding, *International Journal of Solids and Structures* 50 (2013) 2132-2150.
- [12] Truster T.J., Masud A., A discontinuous/continuous Galerkin method for modeling of interphase damage in fibrous composite systems, *Computational Mechanics* 52 (2013) 499-514.
- [13] Masud A., Truster T.J., Bergman L.A., Unified formulation for interface coupling and frictional contact modeling with embedded error estimation, *International Journal for Numerical Methods in Engineering* 92 (2012) 141-177.
- [14] Masud A., Truster T.J., Bergman L.A., A variational multiscale a-posteriori error estimation method for mixed-form of nearly incompressible elasticity, *Computer Methods in Applied Mechanics and Engineering* 200 (2011) 3453-3481.

#### CONFERENCE PROCEEDINGS

- [1] Flicek, R. C., Moore, K. J., Castelluccio, G. M., Brake, M. R. W., Truster, T.J., Hammett, C. I., Stress waves propagating through bolted joints, Proceedings of IMAC Conference & Exposition on Structural Dynamics, Orlando, Florida, January 25 – 28, 2016.
- [2] Truster T.J., Stabilized Nitsche method for combining dissimilar PDEs: Application to spatially localized plasticity, Proceedings of 17th U.S. National Congress on Theoretical and Applied Mechanics, East Lansing, Michigan, June 15 – 20, 2014.
- [3] Truster T.J., Masud A., Bergman L.A., Variational formulation for frictional interface dynamics, Proceedings of ASME 2012 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Chicago, Illinois, August 12 – 15, 2012.
- [4] Masud A., Bergman L.A., Polycarpou A.A., Truster T.J., Eriten M., Modeling of contact interfaces: A novel computational framework, Proceedings of 2011 NSF Engineering Research and Innovation Conference, Atlanta, Georgia, January 4 – 7, 2011.
- [5] Masud A., Bergman L.A., Polycarpou A.A., Patrick J., Truster T.J., A Variational Multiscale a posteriori error estimation method, Proceedings of 2009 NSF Engineering Research and Innovation Conference, Honolulu, Hawaii, June 22 – 25, 2009.

#### TECHNICAL REPORTS

- [1] Dodds R.H. Jr., Truster T.J., Cochran K.B., Parks D.M., Sham T.L., Modeling of Creep Deformation and Fracture of Grade 91 Steel through Crystal Plasticity and Grain Boundary Cavitation, *Argonne National Laboratory*, Report ANL-ART-52, 2016.
- [2] Truster T.J., Discontinuous Element Insertion Algorithm, *University of Tennessee*, November 2015.

- [3] Truster T.J., Parks D.M., Dodds R.H. Jr., Sham T.L., Progress report on the modeling of deformation behavior in the prior austenite grains, *Oak Ridge National Laboratory*, Report ORNL/LTR-2015/354, 2015.
- [4] Truster T.J., Sham T.L., Preliminary report on creep deformation simulation using dislocation-based crystal plasticity model, *Oak Ridge National Laboratory*, Report ORNL/LTR-2014/369, 2014.

## CONFERENCE PRESENTATIONS

### ORAL PRESENTATIONS

- Truster T.J., Masud A., “Stabilized interface formulation for frictional dynamics.” 2016 Engineering Mechanics Institute/ Probabilistic Mechanics & Reliability Joint Conference, Vanderbilt University, Nashville, TN, May 22 – 25, 2016.
- Nassif O., Truster T.J., “Primal method for GND-based kinematic hardening model.” 2016 Engineering Mechanics Institute/ Probabilistic Mechanics & Reliability Joint Conference, Vanderbilt University, Nashville, TN, May 22 – 25, 2016.
- Flicek, R. C., Moore, K. J., Castelluccio, G. M., Brake, M. R. W., Truster, T.J., Hammett, C. I., “Stress waves propagating through bolted joints.” IMAC Conference & Exposition on Structural Dynamics, Orlando, Florida, January 25 – 28, 2016.
- Truster T.J., Hicks W., “Modeling Delamination in Composites under Dynamic Loading using a Stabilized Discontinuous Galerkin Approach.” 13<sup>th</sup> U.S. National Congress on Computational Mechanics, San Diego, CA, July 27 – 30, 2015.
- Masud A., Hlepas G., Truster T.J., “A heterogeneous modeling method with embedded interfaces for porous media flows.” 13<sup>th</sup> U.S. National Congress on Computational Mechanics, San Diego, CA, July 27 – 30, 2015.
- Truster T.J., Nassif O., “Variational Projection and Implicit Integration for Gradient Crystal Plasticity.” 2015 Conference of the ASCE Engineering Mechanics Institute, Stanford University, Stanford, CA, June 16 – 19, 2015.
- Truster T.J., Masud A., “A computational approach for modeling growth of cross-linking in tissue mechanics using mixture theory.” 2014 Conference of the ASCE Engineering Mechanics Institute, McMaster University, Hamilton, Ontario, August 5 – 8, 2014.
- Masud A., Truster T.J., Chen P., “Interface Damage in Composites under Finite Strains.” 17<sup>th</sup> U.S. National Congress on Theoretical and Applied Mechanics, Michigan State University, East Lansing, Michigan, June 15 – 20, 2014.
- Truster T.J., “Stabilized Nitsche method for combining dissimilar PDEs: Application to spatially localized plasticity.” 17<sup>th</sup> U.S. National Congress on Theoretical and Applied Mechanics, Michigan State University, East Lansing, Michigan, June 15 – 20, 2014.
- Truster T.J., Chen P., Masud A., “Stabilized Nitsche method for combining dissimilar PDEs: Application to spatially localized plasticity.” 17<sup>th</sup> U.S. National Congress on Theoretical and Applied Mechanics, Michigan State University, East Lansing, Michigan, June 15 – 20, 2014.
- Truster T.J., Chen P., Masud A., “Discontinuous Galerkin method and Variational Multiscale formulation for interphase damage evolution at finite strains.” 2013 Conference of the ASCE Engineering Mechanics Institute, Northwestern University, Evanston, IL, August 4 – 7, 2013.

- Truster T.J., Masud A., "Modeling of nearly incompressible composite materials using a new stabilized mixed method for tetrahedral elements." 12<sup>th</sup> U.S. National Congress on Computational Mechanics, Raleigh, NC, July 22 – 25, 2013.
- Masud A., Truster T.J., "Unified interface formulation combining Discontinuous Galerkin and Variational Multiscale methods." Advances in Computational Mechanics with Emphasis on Fracture and Multiscale Phenomena, workshop honoring Prof. Ted Belytschko's 70th birthday, Northwestern University, Evanston, IL, April 18 – 20, 2013.
- Truster T.J., Masud A., Bergman L., "Variational formulation for frictional interface dynamics." ASME 2012 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Chicago, IL, August 12 – 15, 2012.
- Truster T.J., Masud A., "A unified framework for modeling of interphase damage in fibrous composite systems." EMI 2012: Engineering Mechanics Inst. Conference/ PMC 2012: 11th ASCE Joint Specialty Conference on Probabilistic Mechanics & Structural Reliability, South Bend, IN, June 17 – 20, 2012.
- Truster T.J., Masud A., Bergman L.A., "Unified interface formulation combining discontinuous Galerkin and variational multiscale methods." 11<sup>th</sup> U.S. National Congress on Computational Mechanics, Minneapolis, MN, July 25 – 28, 2011.
- Truster T.J., Masud A., Bergman L.A., "Unified formulation for interface coupling and frictional contact." American Society of Mechanical Engineers: 2011 Applied Mechanics and Materials Conference, Chicago, IL, May 30 – June 1, 2011.
- Truster T.J., Eriten M., Polycarpou A.A., Bergman L.A., Masud A., "Modeling of contact interfaces: A novel computational framework." 2010 International Joint Tribology Conference, San Francisco, CA, October 18 – 20, 2010.

#### POSTER PRESENTATIONS

- Groß J., Armand J., Lacayo R.M., Schwingshackl, C.W., Reuß P., Truster T.J., Salles L., Kuether R., Brake M.R., "Numerical Round Robin for Predicting the Dynamics of Jointed Structures." ASME 2015 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Boston, MA, August 2 – 5, 2015.
- Flicek R., Moore K., Truster T.J., Hammett C., Castelluccio G., Brake M.R., "Stress Wave Propagation through Jointed Interfaces." ASME 2015 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Boston, MA, August 2 – 5, 2015.
- Truster T.J., Masud A., "Modeling of nearly incompressible composite materials using a new stabilized mixed method for tetrahedral elements." 12<sup>th</sup> U.S. National Congress on Computational Mechanics, Raleigh, NC, July 22 – 25, 2013.
- Truster T.J., Masud A., Bergman L.A., "Unified interface formulation combining discontinuous Galerkin and variational multiscale methods." 11<sup>th</sup> U.S. National Congress on Computational Mechanics, Minneapolis, MN, July 25 – 28, 2011.

## OTHER PRESENTATIONS AND RESEARCH ACTIVITIES

### INVITED PRESENTATIONS

Truster T.J., “Crystal Plasticity Finite Element Modeling of Microtextured Regions in Ti-6242 at High Temperatures,” Materials and Manufacturing Directorate, Air Force Research Laboratory, August 2, 2016.

Truster T.J., “Crystal Plasticity Finite Element Method Coupled with Imaging Techniques for Texture Modeling,” Joint Institute for Neutron Sciences Seminar, Oak Ridge National Laboratory, December 15, 2015.

Truster T.J., “A Stabilized Finite Element Framework for Modeling Slip and Fracture at Interfaces,” Civil Engineering Departmental Seminar, Duke University, September 28, 2015.

Truster T.J., Continuing Education Seminar, “Computational Modeling of Failure at Interfaces in Structures and Materials,” ASCE Knoxville Branch, March 28, 2014.

### WORKSHOPS

Nonlinear Mechanics and Dynamics Summer Research Institute, Sandia National Laboratory and University of New Mexico, Albuquerque, NM, June 20 – July 29, 2016.

- Mentored one group of two students (including own student) on project related to subcritical crack growth in glass

Truster T.J., “Stabilized Interface Method for High Velocity Fracture in Three Dimensions,” Workshop on Brittle Hard Rocks Exposed to High Energetic Cyclic Loads: Experimental and Numerical Discussions, Caterpillar Corporation, November 9, 2015.

Nonlinear Mechanics and Dynamics Summer Research Institute, Sandia National Laboratory and University of New Mexico, Albuquerque, NM, June 23 – July 31, 2015.

- Mentored two groups of three students on projects related to computational modeling of bolted mechanical joints

## RESEARCH PROPOSALS

### ACCEPTED PROPOSALS

*3D Experimental and Computation Studies of Crystallographic Effects on Creep and Fracture in Salt Rock*

National Science Foundation, Geotechnical Engineering and Materials Program, 2016-2019; co-PI with Khalid Alshibli (UTK)

*Crystal Plasticity Modeling of Microtextured Regions in Ti-6242 Alloy*

Air Force Research Laboratory, Summer Faculty Fellowship Program, 2016 (\$20,000)

*Creep-Rupture Modeling Using Crystal Plasticity in WARP3D*

UCHICAGO ARGONNE contract through Argonne National Laboratory, project DE-AC05-000R22725, 2015-2016

*Portable Mechanical Testing System for Fiber Reinforced Polymer Composites*

University of Tennessee Scholarly and Research Incentive Funds, 2015-2016; co-PI with Dayakar Penumadu, Uday Vaidya, and Chad Duty (UTK)

*Implementation of Crystal Plasticity in WARP3D – Phase II*

UT-Battelle contract through Oak Ridge National Laboratory, project DE-AC05-000R22725, 2014-2015

*Implementation of Crystal Plasticity in WARP3D*

UT-Battelle contract through Oak Ridge National Laboratory, project DE-AC05-000R22725, 2014

*Numerical Analysis of Fatigue Characteristics of Materials under Engineered and Natural Loadings*

Sub-award through University of Illinois at Urbana-Champaign from BP America, 2013-2014

## TEACHING EXPERIENCE

UNIVERSITY OF TENNESSEE, KNOXVILLE

Course No.	Course Name	Semester	No. of Students	Instructor Effectiveness of Teaching (out of 5)
CE472	Steel Design	S14	25	4.08
CE538 CE561	Finite Element Applications for Structural and Geotechnical Engineering	F14	18	3.56
CE371	Structural Engineering I	S15	28	4.54
CE472	Steel Design	S15	19	4.21
CE538 CE561	Finite Element Applications for Structural and Geotechnical Engineering	F15	18	3.46
CE472	Steel Design	S16	28	4.68
CE595	Advanced Structural Mechanics	F16	16	

## HONORS

Finalist, Twenty-Fifth Annual Robert J. Melosh Medal Competition for the Best Student Paper on Finite Element Analysis, *Duke University*, 2014

Scholar Recognition Award, Department of Civil & Environmental Engineering, *University of Tennessee – Knoxville*, 2014

Award for the Best Mathematically Oriented Poster, Computers & Mathematics with Applications, *12th U.S. National Congress on Computational Mechanics*, 2013

Graduate Research Fellowship, *National Science Foundation*, 2009

Carver Fellowship, *University of Illinois at Urbana-Champaign*, 2008

## ACADEMIC SERVICE

COMMITTEE MEMBERSHIP

Computational Mechanics Committee, ASCE/Engineering Mechanics Institute (2014-present)

AGENCY SERVICE

NSF Proposal Review Panelist, 2015

## CONFERENCE SYMPOSIA

Session Organizer: “Computational Methods and Applications for Solid and Structural Mechanics,” 2016 Engineering Mechanics Institute/ Probabilistic Mechanics & Reliability Joint Conference, May 22 – 25, 2016, Nashville, TN

Session Co-Organizer: “Modeling the Mechanics of Material Surfaces and Interfaces,” 2016 Engineering Mechanics Institute/ Probabilistic Mechanics & Reliability Joint Conference, May 22 – 25, 2016, Nashville, TN

Session Co-Organizer: “Stabilized and Multiscale Methods for Interface Mechanics,” 13th U.S. National Congress on Computational Mechanics, July 27 – 30, 2015, San Diego, CA

Session Co-Organizer: “Computational Methods and Applications for Solid and Structural Mechanics,” 2015 Conference of the ASCE Engineering Mechanics Institute, June 16 – 19, 2015, Stanford, CA

Session Co-Organizer: “Stabilized and Multiscale Methods for Interface Mechanics,” 17th U.S. National Congress on Theoretical & Applied Mechanics, June 15 – 20, 2014, East Lansing, MI

Session Co-Chair: “Computational Modeling of Interfaces in Complex Systems,” ASME: 2011 Applied Mechanics and Materials Conference, May 30 – June 1, 2011, Chicago, IL

## REVIEW ACTIVITIES

Journal of Engineering Mechanics (2013-present), Finite Elements in Analysis and Design (2014-present), Journal of Applied Mechanics (2014-present), Engineering Fracture Mechanics (2014-present), Advances in Applied Mathematics and Mechanics (2015-present), Computer Methods in Applied Mechanics and Engineering (2015-present), Mechanics Research Communications (2015-present), International Journal of Heat and Mass Transfer (2016-present) , Materials (2016-present)

## UNIVERSITY OF TENNESSEE

Search Committee, Assistant Professor of Structures, 2014-2015

Search Committee, Assistant Professor of Structures, 2015-2016

## PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers, 2004 – Present

American Society of Mechanical Engineers, 2010 – Present

Structural Engineers Association, 2008 – Present

Chi Epsilon, 2006 – Present

United States Association for Computational Mechanics, 2012 – Present

American Society of Engineering Education, 2013 – Present