

**Stephanie C. TerMaath, PhD, PE\***  
**Associate Professor and Zeanah Faculty Fellow**  
**Mechanical, Aerospace, and Biomedical Engineering (MABE)**  
**University of Tennessee, Knoxville (UTK)**  
**\*NC Professional Mechanical Engineering License 033553**

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**EDUCATION**

PhD, Cornell University, 2000

Civil Engineering (Structural Mechanics, minor in structural dynamics)

Dissertation: A Two-Dimensional Analytical Technique for Studying Fracture in Brittle Materials Containing Interacting Kinked and Branched Cracks

MS, Purdue University, 1995

Civil Engineering (Structural Mechanics, emphasis in structural dynamics)

Thesis: Behavior of a Pipeline that Contacts a Gap Constraint

BS, Pennsylvania State University, 1993

Honor's degree in Civil Engineering (Structures) with High Distinction

Thesis: A Spreadsheet for Machine Foundation Analysis using the Impedance Function Approach

**HONORS**

2019 UTK Chancellor's Professional Promise in Research and Creative Achievement Award

2019 UTK College of Engineering's Professional Promise in Research Award

2019 National Academy of Engineering's German/American Frontiers of Engineering Program (GAFOE)

2017 MABE Department Faculty Initiative and Leadership Award

2016 UTK Chancellor's Angie Warren Perkins Award (honoring a woman leader on campus)

2016 MABE Department Outstanding Junior Faculty Award

2015 National Academy of Engineering's US Frontiers of Engineering (FOE) Program

2015 UTK College of Engineering Moses E. and Mayme Brooks Distinguished Professor Award

2015 TN Louis Stokes Alliance for Minority Participation (TLSAMP) Research Advisor of the Year

2014 Penn State Schreyer Honors College Outstanding Alumni Mentor

2013-2014 Higher Education Resource Services (HERS) Wellesley Institute (Leadership program for women)

2012-pres Associate Fellow, American Institute of Aeronautics and Astronautics (AIAA)

2011 Applied Research Associates (ARA) Leadership Development Program

2011 AIAA December Spotlight Member of the Month

2010 Applied Research Associates Technical Achievement Award

2005 Lockheed Martin Special Recognition Award

2004 Lockheed Martin Special Recognition Award

1999-2000 American Association of University Women Fellowship (1 of 39 recipients nationwide)

1999 President's Council of Cornell Women Grant (1 of 11 recipients university-wide)

1999 Best Student Paper Presentation Award: 31<sup>st</sup> ASTM National Symposium on Fatigue and Fracture Mechanics

1998 Best Student Paper Presentation Award: 30<sup>th</sup> ASTM National Symposium on Fatigue and Fracture Mechanics

1998-1999 George Winter Graduate Fellowship (Outstanding academic achievement and commitment to the humanities)

1996-99 National Science Foundation Graduate Research Fellowship

## ACADEMIC EXPERIENCE

**2020-present Associate Professor, MABE, UTK**

**2014-2020 Assistant Professor, MABE, UTK**

**2012- 2014 Assistant Professor, Civil and Environmental Engineering (CEE), UTK**

### Affiliated Positions:

- First UTK College of Engineering's Jessie Rogers Zeanah Faculty Fellow
- Member, NASA Engineering and Safety Center (NESC) Technical Discipline Team (TDT)  
~900 engineering experts nationwide, 2% from academia
- Associated Faculty, Joint Institute of Computational Sciences (JICS)  
– UTK and Oak Ridge National Laboratory (ORNL) collaboration
- Adjunct Faculty, UTK Department of Materials Science and Engineering
- Temporary Member of the Graduate Faculty, University of Alabama
- Core Faculty, UTK Institute of Biomedical Engineering (iBME) (2013-2015)  
- Led the Systems Modeling and Simulation Group
- Participant, Office of Naval Research (ONR) Summer Faculty Fellowship Program (2014)

### Past and Current Funding: (My research contribution is defined by the bulleted descriptions.)

UTK Lead PI: Congressional Add managed by Air Force Research Laboratory (AFRL) (\$2.5M: 2020-2022)

*Title: Material Maturation and Risk Reduction for Hypersonic Platforms*

- Simulate the effects of carbon/carbon microstructure (including voids, microcracks, and imperfections) on macroscale performance under thermal cycles due to hypersonic loading conditions
- Explore the coupled interaction between the structural surface (roughness, imperfections, and cracking) and the aerodynamic environment

PI: Naval Surface Warfare Center Naval Engineering Education Consortium (\$25K: 2020-2021)

*Title: A multi-scale, multi-physics solution to inform water bottle recycling at US Navy makerspaces*

- Develop a desktop printer to extrude water bottles
- Investigate the validity of composite laminate theory in predicting the mechanical properties of AM parts
- Explore the potential of dual extrusion to fabricate optimized parts using two materials

Co-PI: Congressional Add managed by AFRL (\$1.3M: 2019-2022)

*Title: Development of Hypersonic Vehicle Flight Test Structure*

- Simulate material degradation of an actively controlled fin under hypersonic loading conditions

PI: Alliance of Women Philanthropists Giving Circle Grant (\$6.8K: 2019)

*Title: SuSTEMability Pilot Program*

- Implement an after school program developed by the PI to engage elementary grade girls at socio-economically disadvantaged schools through hands-on Science, Technology, Engineering, and Mathematics (STEM) activities. This program will be taught by women graduate students from the University of Tennessee's WiSTAR3 organization to provide women role models and mentors to inspire girls to pursue STEM fields. This innovative program integrates STEM outreach, college preparation, and environmental sustainability awareness.

PI: National Institute of Health (NIH) R15 (\$421K: 2018-2021)

*Title: Characterization of Ventricular Catheter Performance for Improved Treatment of Pediatric Hydrocephalus*

- Develop a revolutionary experimental test apparatus to investigate cerebrospinal fluid (CSF) flow through obstructed ventricular catheters using a surrogate head model built to realistically model pulsatile CSF flow throughout the ventricular system and controlled by a physiology engine to capture systemic effects on CSF pressure and flow rates

- Formulate the first computational model to capture ventricle/CSF interaction, pulsatile CSF behavior, and valve transient effects to generate physically realistic boundary conditions to simulate catheter performance
- Optimize a ventricular catheter to reduce obstruction and failure rates (patients currently require 2-4 neurosurgeries every 10 years due to brain shunt failure)

Co-PI: NASA University Leadership Initiative (ULI) (\$9.9M: 2017-2022)

*Title: Advanced Aerodynamic Design Center for Ultra-Efficient Commercial Vehicles*

- Perform structural topology optimization of a slotted natural laminar flow (SNLF) airfoil concept to reduce weight while achieving structural integrity of a revolutionary wing design expected to reduce fuel consumption by 70% relative to the 2005 baseline
- Direct the educational plan for K-12 outreach and undergraduate research

PI: Naval Surface Warfare Center Naval Engineering Education Consortium (\$502K: 2016-2019)

*Title: Integrated Simulation and Testing for the Qualification of Composite Parts Fabricated through Additive Manufacturing*

- Investigate and demonstrate the potential of an integrated experimental and computational approach to the qualification process of composite parts fabricated with embedded fibers using big area additive manufacturing (BAAM)
- Develop a multi-scale computational simulation method based on peridynamics and finite element analysis to predict probability density functions for the mechanical properties (stiffness, strength, and fracture) of reinforced polymer materials used for Fused Filament Fabrication (FFF)

PI: Tennessee Teaching and Learning Center Teaching Innovation Grant (\$3.5K: 2016)

*Title: An Active Learning Approach to Empower Students for Success in Aerospace Engineering*

- Investigate the implementation of experiential, problem-based learning activities in introductory engineering courses designed to enhance Generation Z student engagement through increased intellectual challenge and applicability to real world problems

Co-PI: National Science Foundation Industry University Cooperative Research Center (\$495K: 2015-2020)

*Title: Center for Integrative Materials Joining Science for Energy Applications (CIMJSEA)*

- Study the joining of dissimilar materials fabricated from additive manufacturing to support printing layers of varying material type and investigate the effects of porosity on the fatigue crack initiation and growth rates in the Ti metal substrate (Specific project is funded by Boeing)

PI: Consolidated Nuclear Services (CNS) (\$27K: 2015)

- Develop a quality assurance plan for the structural analysis of shipping containers for radioactive materials

PI: Office of Naval Research Young Investigators Program (ONR YIP) (\$510K: 2014-2018)

*Title: Probabilistic Multi-Scale Damage Tolerance Modeling of Composite Patches for Naval Aluminum Alloys*

- Investigate the reliability of hybrid structure through validated, physics-based, multi-scale modeling encompassing first principle calculations and numerical methods including Density Functional Theory (DFT), Peridynamics (PD), analytical crack growth prediction, and Finite Element (FE) Analysis
- Explore the damage tolerance of hybrid structure through high fidelity analysis of interacting damage mechanisms and identify the most influential design parameters on damage initiation and growth. Damage mechanisms include: interlaminar and intralaminar composite overlay damage, plasticity, sensitization and crack growth in 5xxx series aluminum, as well as disbond at the metal/polymer interface

PI: Science Alliance JDRD Collaborative Cohort Program (\$50K: 2014-2016)

*Title: Supercomputing for Multi-Disciplinary Optimization of Obstructed Ventricular Catheters*

- Optimize the structural design of ventricular brain catheters using supercomputing

- Redesign ventricular catheter for uniform CSF flow through inlet holes and identify the most influential geometric parameters on catheter performance

PI: Joint Institute of Computational Sciences (JICS) (\$25K: 2013-2015)

-Collaborate with JICS in the area of big data and the integration of computational structural mechanics and fluid dynamics

#### Student Awards:

- Cody Crusenberry: Chancellor's Award for Exceptional Professional Promise (2020)
- Benjamin Ingling: 3rd Place Undergraduate Paper Competition, AIAA Region II Student Conference (2019)
- William Ferrell: Student Champion for Research Compliance and Safety (2018)
- Tyler Newsom: Honorable Mention in Engineering category at Eureka Poster Competition (2017)
- Aaron Anderson-Walker: Chancellor's Award for Exceptional Professional Promise (2017)
- Sofy Weisenberg: American Society of Mechanical Engineers (ASME) Fluids Engineering Division Graduate Scholar of the Year Award (2016)
- Sofy Weisenberg: Chancellor's Award for Exceptional Professional Promise (2016)
- Madeline Hayes: Second Place Undergraduate Poster at the Women in STEM Symposium (2016)
- Madeline Hayes: Honorable Mention in Health Sciences category at Eureka Poster Competition (2016)
- Melanie Rae Smith: Second place in the engineering category of the poster competition at the Eleventh Annual TLSAMP Undergraduate Research Conference (2014)

#### **COURSES TAUGHT:**

Structural Mechanics, Mechanical Vibrations, Finite Element Analysis, Introduction to Aerospace Engineering, Mechanics of Materials, Senior Design, Rock Fracture

#### **STUDENT ADVISING**

##### PhD Graduates as Major Professor

Ferrell, W. (2020) Processing-Structure-Performance Relationships in Fused Filament Fabricated Fiber Reinforced ABS for Material Qualification, PhD Thesis.

Heng, B. (2018) Damage Tolerance of Composite Patches for Repair of Aluminum Structure. University of Tennessee, PhD Thesis.

##### PhD Graduates as a Committee Member

Kronyak, Rachel (2019) Investigations into fracture and vein networks in Gale Crater, Mars. University of Tennessee, PhD Thesis.

Fox, Lindsey (2019) Two Applications of Mathematical Modeling: Control Mechanisms of Heart Rate Variability and Contribution of Environmental Pathways in Disease Transmission. University of Tennessee, PhD Thesis.

Clarke, Philip (2018) Inhomogeneous media characterization based on multi-scale material uncertainties: A statistically based framework for dynamic fracture modeling of "realistic" (quasi-) brittle materials. University of Tennessee, PhD Thesis.

Jing, Yuan (2017) Experimental and Analytical Study of Dynamic Behavior of Bridge Superstructures Subjected to Overheight Vehicle Collisions. University of Tennessee, PhD Thesis.

MS Thesis Graduates as Major Professor

Schumacher, A. (2019) Characterizing and Comparing Tri-structural Isotropic Fuel Coating Properties from Fuel Trials AGR-1 and AGR-2, University of Tennessee, MS Thesis.

Garrison, B. (2018) Failure Properties and Phenomena from Ring Compression Testing of Ziraloy-4. University of Tennessee, MS Thesis.

Weisenberg S. (2016) Improving Ventricular Catheter Design through Computational Fluid Dynamics. University of Tennessee, MS Thesis.

Weigand J. (2013) An Automated Finite Element Analysis Framework for the Probabilistic Evaluation of Composite Lamina Properties. University of Tennessee, MS Thesis.

Goodmiller G. (2013) Investigation of Composite Patch Performance under Low-Velocity Impact Loading. University of Tennessee, MS Thesis.

MS Thesis Graduates as a Committee Member

David Palmer (2019) Propulsion/Airframe Integration of an Ultra High-Bypass Ratio Turbofan and a Slotted, Natural-Laminar-Flow Wing. University of Tennessee, MS Thesis.

Bahador Bahmani (2019) A stochastic continuum damage model for dynamic fracture analysis of quasi-brittle materials using asynchronous Spacetime Discontinuous Galerkin (aSDG) method. University of Tennessee, MS Thesis.

Daniel Seth Elkins (2018) Metal-Polymer Adhesive Bond Characterization in an Additive Manufacturing Environment. University of Tennessee, MS Thesis.

Ashwin Parwani (2018) A study of the effects and significance of transition modeling for rotorcraft applications. University of Tennessee, MS Thesis.

Current Graduate Students as Major Professor

Corey Arndt (PhD)

Robert Fleishel (PhD)

Cody Crusenberry (PhD)

Sung Kwon (PhD)

Kurt Smith (MS, thesis)

Zachary Nolan (MS, thesis)

Undergraduate Research Assistants

70+ spanning civil, mechanical, chemical, aerospace, biomedical, nuclear, material science, and computer science engineering majors resulting in student careers including US Navy, Boeing, GE Aviation, NASA, graduate school, and medical school

**INDUSTRY EXPERIENCE**

**2005-2012 Senior Engineer and Group Leader, Applied Research Associates**

Leadership:

- Managed Physics Based Computing Group in the Southeast Division (SED)
- Developed and taught ARA training class for new employees and young engineers
- Managed the engineering intern program
- Led strategic business development initiatives in HPC/GPU computing and biomedical engineering
- Led multi-million dollar proposal efforts -- proactive in forming university partnerships
- Managed Fort Worth office and served as Facility Security Officer (FSO)

Technical:

- Led extensive verification and validation programs, including the Defense Threat Reduction Agency's (DTRA) Integrated Munitions Effects Assessment (IMEA) and Nuclear Capabilities Services (NuCS)
- Led and performed a dynamic finite element analysis (EPIC and LS-DYNA) for a major new penetrator weapon (Massive Ordnance Penetrator, part of DTRA's Hard Target Defeat Program)
  - Evaluated structural survivability of missile case and aft end components
  - Investigated high explosive fill behavior under extreme impact loading conditions
  - Identified potential failure risks for redesign and additional testing
- Performed shock spectra analysis for BLU-109 penetrator (part of the Enhanced Fuze Integrated Bomb Damage Information Demonstration, EFIBDID, Program )

**2004-2005 Senior Engineer, Lockheed Martin Aeronautics Company**

- Managed material (metallic and composite) test programs to determine design properties and durability and damage tolerance (dadt) allowables for the Joint Strike Fighter (JSF)
  - Ran comprehensive test programs to collect material properties, process the data, develop design properties, and implement the derived information into software tools
- Validated dadt analytical tools using test results while part of the JSF Airframe Certification Team
- Performed structural analysis for weight reduction trade studies as a dadt analyst on the JSF wing team

**2002-2004 Mechanics and Materials Engineer, Exponent Failure Analysis Associates**

- Performed finite element analysis (Ansys and Abaqus): 3D modeling of complex geometries, nonlinear and inelastic analysis, contact surfaces
  - Projects included: threaded pipeline connections with Teflon seals, breakaway coupling, coal silo, filter housing, medical devices, cast iron valve, plastic gas tank
- Performed post-failure investigations: natural gas pipeline, wastewater treatment plant

**2001-2002 Engineer/Scientist Specialist, The Boeing Company Phantom Works**

- PI on company-wide Unitized Structures Team (managed internal research funds for damage arrestment analysis and analytical tool development for crack growth through damage containment features)
- Projects included:
  - Air Force contract to study Benefits of Unitized Metallic Structures for sustainment of aging aircraft
  - Thermal coating production evaluation for the Delta IV thermal shield
  - Damage tolerance study for the elimination of deburring during C-17 production
  - 737-800 Provisional Model Structural Repair Manual modifications for wing skins
  - Acoustic fatigue evaluation on the C-17

**PROFESSIONAL SERVICE**

- Member, MABE Promotion and Tenure (P&T) committee (2020-present)
- Panelist, New Faculty Orientation (2020)
- Member, Inclusive Teaching Taskforce (2019-2020)
- US National Academy of Engineering Delegate, Global Grand Challenges Summit, London, UK (2019)
- Panelist, Womengineer's Day (2019)
- Founder and Director, SuSTEMability, an after school program to prepare elementary school girls at socio-economically disadvantaged schools for college and STEM fields (2019-present)
- Panel member, NASA 2040 Vision Study: A Vision for Multi-Scale Materials and Structures Modeling and Simulation, Key Element Panel #2: Education and Training (2017-2018)
- Founder and Director, WiSTAR<sup>3</sup>: Women in STEM Advancing Research, Readiness, and Retention, a program for women graduate students in STEM fields aimed at increasing retention and preparation for academic careers through professional development (2016-present)
- Panelist, Women in STEM Symposium (2016)

- Instructor and Mentor, International High Performance Computing Summer School (2015, 2017)
- Member, UTK Commission for Women (2015-2017)
- Coordinator, MABE Distinguished Seminar Series (2014 – 2018)
- Panelist, Future Faculty Program to mentor future faculty from under-represented groups (2014, 2016)
- Member, UTK Provost's Junior Faculty Fellowship Program (2013-2020)
- Leader and developer, Civil Engineering Discovery sessions for High School Introduction to Engineering Systems (HITES) and Engineering Volunteers for 9<sup>th</sup> Graders (EVOL9) summer programs (session was featured on local nightly news and in the News Sentinel) (2013)
- Discussion leader, Life of the Mind UTK Freshman Orientation Program (2013, 2014, 2016)
- Faculty advisor, Society of Women Engineers (SWE) (2013 – 2018)
- Faculty advisor for Mindset (K-12 outreach), Tau Beta Pi (2013 – 2015)
- Mentor, Penn State Honor's Program (2012 – 2019)
- Member, American Society for Engineering Education (ASEE) (2012-present)
- Associate Fellow, American Institute of Aeronautics and Astronautics (AIAA)
  - Structures Technical Committee (STC) (2005-present)
  - Integrated Computational Materials Engineering (ICME) Working Group (2016-present)
  - Chair of STC ICME subcommittee (2020-present)
  - ICME Vice Chair Workforce Development & Education subcommittee (2019-present)
  - Chair of the Biannual ICME Competition (2020-present)
  - Digital Engineering Integration Committee (2018-present)
  - Deputy Director for Young Professionals for Region IV (2005-2006)
  - Vice Chair for Young Professionals of Orange County, CA section (2001-2002)
  - Special session organizer, session chair, abstract reviewer, and student paper judge at annual SciTech conference
  - Peer Reviewer for Associate Fellow Selection (2020)
- Search committee member: College of Engineering Associate Dean (2019), College of Engineering Dean (2018), MABE Faculty Position (2018), iBME Director (2015), UTSI Research Professor (2015), Office of Research and Engagement, Research Development Team Manager of Strategic Research Initiatives (2015)

## **REVIEWER**

- National Institute of Health (NIH) proposal review
- UTK Mission Seed proposal review
- University of Tennessee Chattanooga proposal reviewer
- American Society for Engineering Education (ASEE)
- Journal of Polymer Testing
- North Dakota's Experimental Program to Stimulate Competitive Research (EPSCoR)
- American Society for Testing and Materials (ASTM) Journal for Testing and Evaluation
- The Composites and Advanced Materials Expo (CAMX)
- American Institute of Aeronautics and Astronautics (AIAA) SciTech Student Paper Competition judge
- National Science Foundation (NSF) panelist
- DoD SMART scholarship reviewer
- Pursuit (UTK undergraduate research journal)
- Fluids and Barriers of the Central Nervous System (CNS)
- Mechanics Based Design of Structures and Machines (MBDSM)

## **PEER-REVIEWED PUBLICATIONS** (\* indicates student author)

Fleishel, R.\*, Cauthen, C.\*, Daniewicz, S., Jordan, B., Baker, A., and TerMaath, S. (in review) Prediction of Fatigue Microcrack Growth Rate in Aluminum Alloys. Submitted to *Frontiers in Materials*.

- Ferrell, W.\* and TerMaath, S. (in review) Fracture Behavior of Fused Filament Fabricated Polymers: A Review. Submitted to *Advanced Manufacturing*.
- TerMaath, S., Coleman, J., Walker, J., and Lavan, C. (in review) Experiential learning to engage generation Z students in introductory engineering courses. *Submitted to Advances in Engineering Education*.
- Stefanski, D., Killeffer, J., and TerMaath, S. (in print) Computational modeling and simulation to quantify the effects of obstructions on the performance of ventricular catheters used in hydrocephalus treatment. *Submitted to Bioengineering Technologies*.
- Garrison, B\*., Yong, Y., and TerMaath, S. (in review) Determining failure properties of as-received and hydrided unirradiated zircaloy-4 from ring compression tests. *Submitted to Engineering Failure Analysis*.
- Kronyak, R\*., Arndt, C\*., Kah, L., and TerMaath, S. (2020) Predicting the mechanical and fracture properties of lithologies in Gale crater. *Earth and Space Science*.
- Zhang, J.\*., TerMaath, S., and Shields, M. (2020) Imprecise global sensitivity analysis using Bayesian multimodal inference and importance sampling. *Mechanical Systems and Signal Processing*.
- Zhang, J.\*., Shields, M., and TerMaath, S. (2020) Probabilistic prediction of out-of-plane unidirectional composite lamina properties. *Mechanics of Advanced Materials and Structures*. DOI 10.1080/15376494.2020.1733713.
- Ferrell, W\*., Arndt, C\*., and TerMaath, S. (2020) Tensile strength dependence of fused filament fabrication fiber reinforced ABS on environmental conditioning. *Mechanics of Advanced Materials and Structures*. DOI 10.1080/15376494.2020.1722870.
- Ferrell, W\*., Clement, J., and TerMaath, S. (2019) Uniaxial tensile testing standardization for the qualification of fiber reinforced plastics for fused filament fabrication. *Mechanics of Advanced Materials and Structures*. DOI 10.1080/15376494.2019.1660438.
- Bray, Webb, Enquobahrie, Vicory, Heneghan, Hubal, TerMaath, Asasre, and Clipp (2019) Pulse Physiology Engine: An Open Source Software Platform for Computational Modeling of Human Medical Simulation *SN Comprehensive Clinical Medicine*. doi: 10.1007/s42399-019-00053-w.
- Hayes\*, M., TerMaath, S., Crook, R., and Killeffer, J. (2019) A review on the effectiveness of surgical intervention for symptomatic intracranial arachnoid cysts in adults. *World Neurosurgery*, 123: pp e259-e272.
- Weisenberg\*, S., TerMaath, S., Barbier, C., Killeffer, J., and Hill, J. (2018) A Computational Fluid Dynamics Simulation Framework for Ventricular Catheter Design Optimization, *Journal of Neurosurgery*, 129(4), 1067-1077.
- TerMaath, S., Crosby, L., and Heng\*, B. (2017) Multi-scale Sensitivity Analysis to Optimize the Bondline Performance of Composite-Metal Co-Cured Joints. *Proceedings of the 12<sup>th</sup> International Conference on Structural Safety and Reliability (ICOSSAR 2017)*.
- Weisenberg\*, S., TerMaath, S., Seaver, C, and Killeffer, J. (2016) Ventricular catheter development: past, present, and future. *Journal of Neurosurgery*, 125(6): pp. 1504-1512.
- TerMaath, S., Retherford, J., Stevens\*, E., and Timilsina, R. (2016) Evaluation of the effects of design uncertainty on the damage tolerance of composites patches, *Life-Cycle of Engineering Systems*, CRC Press, pp. 1899-1906.
- Weisenberg\*, S. and TerMaath, S. (2016) Optimization of Ventricular Catheter Design Using High-Performance Computing. *Proceedings of the ASME 2016 Fluids Engineering Division Summer Meeting*, FEDSM2016-7675
- TerMaath, S. and Hart, D. (2015) Effects of Input Uncertainty on Composite Patch Disbond under Impact Loading, *Analysis and Design of Marine Structures V*, ed. C.G. Soares and R.A. Shenoi, pp. 785-792.



Adley, M., Frank, A., Danielson, K., Akers, S., Cargile, J., Patterson, B., and TerMaath, S. (2012) Generating penetration resistance functions with a virtual penetration laboratory (VPL). *International Journal of Structural Stability and Dynamics*, 12(4).

Yavuz, A.K., Phoenix, S.L., and TerMaath, S.C. (2006) An accurate and fast analysis for strongly interacting multiple crack configurations including kinked (V) and branched (Y) cracks. *International Journal of Solids and Structures*, 43(22-23), pp. 6727-6750.

Yavuz, A.K., Phoenix, S.L., and TerMaath, S.C. (2006) Multiple Crack Analysis in Finite Plates. *AIAA Journal*, 44(11), pp. 2535-2541.

TerMaath, S.C., Phoenix, S.L., and Hui, C.-Y. (2006) An analytical technique for studying interacting cracks of complex geometry in 2D. *Engineering Fracture Mechanics*, 73(8), pp. 1086-1114.

TerMaath, S.C. and Phoenix, S.L. (2002) An analytical method for studying cracks with multiple kinks. *Fatigue and Fracture Mechanics: 33<sup>rd</sup> Volume, ASTM STP 1417*, W.G. Reuter and R.S. Piascik, Eds., ASTM International, West Conshocken, PA, pp.741-756.

TerMaath, S.C. and Phoenix, S.L. (2000) Investigation of a new analytical method for treating kinked cracks in a plate. *Fatigue and Fracture Mechanics: 31<sup>st</sup> Volume, ASTM STP 1389*, G.R. Halford and J.P. Gallagher, Eds., pp. 331–347.

TerMaath, S.C., Ingraffea, A.R., and Wawrzynek, P.A. (1999) A computational fracture mechanics approach for the analysis of facesheet-from-core disbond of honeycomb core sandwich panels. *Fatigue and Fracture Mechanics: 30<sup>th</sup> Volume, ASTM STP 1360*, Paris and Jerina, Eds., pp. 169–182.

### **SESSION CHAIR**

- Workshop on Experimental and Computational Fracture Mechanics: Validating peridynamics and phase field models for fracture prediction and experimental design, Baton Rouge, LA, Feb 2020.
- Structural Joints and Repair (AIAA SciTech), Orlando, FL Jan 2020.
- Integrated Computational Materials Engineering (ICME) - Additive Manufacturing Modeling (AIAA SciTech), San Diego, CA, Jan 2019.
- Structural Joints and Repair (AIAA SciTech), San Diego, CA, Jan 2019.
- Structural Joints and Repair (AIAA SciTech), San Diego, CA, Jan 2016.
- Damage, Fatigue, and Fracture, Composites and Advanced Materials Expo (CAMX), Dallas, TX, Oct 2015.
- Renewable Energy, 5<sup>th</sup> International Conference on Marine Structures (MARSTRUCT), Southampton, UK, March 2015.
- Uncertainty and Reliability, 5<sup>th</sup> International Conference on Marine Structures (MARSTRUCT), Southampton, UK, March 2015.
- Special Session: Structural Joints and Repair (AIAA SciTech), Orlando, FL, Jan 2015.
- Special Session: Structural Joints (AIAA SciTech), National Harbor, MD, Jan 2014.
- Structural Optimization (54<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference), Boston, MA, April 2013.

### **INTERNATIONAL PRESENTATIONS**

1. Nolan, Z.\*, Crusenberry, C.\*, and TerMaath, S. (2021-accepted) Computational prediction of the damage tolerance of composite parts manufactured by fused filament fabrication. 14<sup>th</sup> World Congress in Computational Mechanics and ECCOMAS Congress, virtual, Jan 11-15.
2. Ma, Heng, and TerMaath (2018) First principle based multi-scale modeling to predict bondline strength of co-cured composite-metal joints. 13<sup>th</sup> World Congress in Computational Mechanics, New York City, NY, July 22 - 27.

3. Heng\* and TerMaath (2018) Multi-scale fracture mechanics approach to simulate crack propagation in repaired sensitized aluminum. 13<sup>th</sup> World Congress in Computational Mechanics, New York City, NY, July 22 - 27.
4. Ma, Heng\*, Seleson, and TerMaath (2018) First-principle based atomistic calculations and mesoscale modeling to investigate material failure. 6<sup>th</sup> European Conference on Computational Mechanics (ECCM), Glasgow, UK, June 11–15.
5. TerMaath, S., Retherford, J., Stevens, E.\*, and Timilsina, R. (2016) Evaluation of the Effects of Design Uncertainty on the Damage Tolerance of Composite Patches” 5<sup>th</sup> International Symposium on Life-Cycle Civil Engineering (IALCCE), Delft, The Netherlands, Oct 16-19, 2016.
6. TerMaath, S. and Hart, D. (2015) Effects of Input Uncertainty on Composite Patch Disbond under Impact Loading. 5<sup>th</sup> International Conference on Marine Structures (MARSTRUCT), Southampton, UK, March.

## **US PRESENTATIONS**

1. Crusenberry, C. \* and TerMaath, S. (2021-accepted) Investigation of Sensitivity Analysis Methods for Computationally Intensive Models Characterized by Large Parameter Sets, AIAA SciTech, virtual, Jan 11-15.
2. Arndt, C.\*, Stefanski, D., and TerMaath, S. (2021-accepted) Investigation of Fore-Aft Element Connectors for a Slotted, Natural-Laminar-Flow Airfoil, AIAA SciTech, virtual, Jan 11-15.
3. Kumpatla, S.\*, Arndt, C.\*, Coder, J., and TerMaath, S. (2021-accepted) History of the Slotted, Natural-Laminar-Flow Airfoil, AIAA SciTech, virtual, Jan 11-15.
4. TerMaath, S. (2020) Variability in Additive Manufacturing and its Effects on Structural Performance. Tennessee Society of Professional Engineers. Knoxville, TN, Jan. 27.
5. Long, E., Goertz, H., TerMaath, S., and Coder, J. (2020) Experiential Learning for Engineering Students through Educational Outreach and Leadership, SciTech, Orlando, FL, Jan 6-12.
6. TerMaath, S. and Ferrell, W. (2019) Qualification of Reinforced Polymers for Fused Filament Deposition. NAVAIR Workshop on Additive Manufacturing, Seattle, WA, July 16-18.
7. Ferrell, W., TerMaath, S., and Madhukar, M. (2019) Metal Polymer Composite Joining. Industrial Advisory Board Meeting of the NSF Industry/University Cooperative Research Center (I/UCRC): Manufacturing and Materials Joining Innovation Center (Ma2JIC) Lehigh University June 26-27.
8. TerMaath, S. and Ferrell, W. (2019) Integrated Simulation and Testing for the Qualification of Composite Parts Fabricated Through Additive Manufacturing. NAVAIR Technical Seminar, Patuxent River, MD, April 9.
9. TerMaath, S. (2019) Probabilistic Multi-Scale Damage Tolerance Modeling of Composite Patches for Naval Aluminum Alloys. Naval Surface Warfare Center Carderock Division (NSWCCD) Technical Seminar, January 23.
10. Ferrell, W. and TerMaath, S. (2019) Integrated Simulation and Testing for the Qualification of Composite Parts Fabricated Through Additive Manufacturing. Naval Surface Warfare Center Carderock Division (NSWCCD) Technical Seminar, January 22.
11. TerMaath, S. (2019) Sensitivity analysis for multi-scale modeling to inform design optimization. Uncertainty Quantification in Computational Solid and Structural Materials Modeling, Johns Hopkins University, January 17-18.
12. Arndt, C., Heng, B., Ma, X., and TerMaath, S. (2019) Damage Tolerance Prediction for a Hybrid Composite/Metal Structure under Three Point Bending, AIAA SciTech, San Diego, CA, Jan 7-11.
13. Ferrell, W. and TerMaath, S. (2019) Print Parameter Effects on the Fracture Properties of Fiber Reinforced ABS Composites Fabricated Through Fused Deposition Modeling, SciTech, San Diego, CA, Jan 7-11.
14. Bingham, Z. and TerMaath, S. (2018) A physically realistic experimental apparatus for evaluating ventricular catheter performance. Biomedical Engineering Society Annual Meeting, Atlanta, GA, Oct 17-20.
15. TerMaath, S. and Wood, S. (2018) The importance of transient physics and boundary conditions in simulating ventricular catheter performance. Biomedical Engineering Society Annual Meeting, Atlanta, GA, Oct 17-20.

16. Cauthren, C. Jordan, B., Daniewicz, S., and TerMaath, S. (2018) Fatigue Crack Growth Predictions of Complex Crack Geometries. Society for Experimental Mechanics Southeast Graduate Symposium on Experimental Mechanics, Huntsville, AL.
17. Ma, Heng, and TerMaath (2018) Integrated first-principle calculations with mesoscale modeling to investigate sensitization induced cracking in metal alloys. Engineering Mechanics Institute Conference, Massachusetts Institute of Technology, May 29-June 1.
18. TerMaath, S. (2018) Integrated Simulation and Testing for the Qualification of Composite Parts Fabricated Through Additive Manufacturing. Naval Engineering Education Consortium (NEEC) Mid-Atlantic Annual Meeting, April 11.
19. Ferrell, W. and TerMaath, S. (2018) Determination of Sensitive Print Parameters on Mechanical Behavior of Parts Fabricated Through Additive Manufacturing. Naval Surface Warfare Center Carderock Division (NSWCCD) Technical Seminar, March 12.
20. Heng and TerMaath (2018) Prediction of Damage Tolerance in Metallic Structure Repaired with a Co-Cured Composite Patch. 58<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Kissimmee, FL, Jan 8-12.
21. Ferrell and TerMaath (2018) Sensitivity Analysis to Reduce Variability in the Mechanical Properties of Chopped Fiber Reinforced ABS Parts Fabricated with Additive Manufacturing. AIAA Non-Deterministic Approaches Conference. Kissimmee, FL, Jan 8-12.
22. Cauthren, C., Burford, E., Daniewicz, S., and TerMaath, S. (2017) Evaluation of Stress Intensity Factors Using Dislocation Distribution Theory for Kinked Cracks Subjected to Fatigue Loading. American Society for Testing Materials (ASTM) Committee E08 Student Presentation, Atlanta, GA.
23. TerMaath, S. (2017) Multi-Scale ICME to Optimize the Bondline Performance of Composite-Metal Co-Cured Joints. Mechanical Engineering Seminar, University of Alabama, October 3.
24. TerMaath, S. (2017) Modeling and Simulation of Patched Structure under Low Velocity Impact Loading. 14<sup>th</sup> US National Congress for Computational Mechanics (USNCCM), Montreal, Canada, July 16-21.
25. TerMaath, S. (2016) Probabilistic Multi-Scale Damage Tolerance Analysis of Bimaterials. University of Alabama Department of Aerospace Engineering Seminar, Tuscaloosa, AL, April 7.
26. Phelps, N. and TerMaath, S. (2017) Probabilistic Characterization of Composite-Aluminum Co-cured Joints. AIAA SciTech, Grapevine, TX, Jan 9-13.
27. Weisenberg, S. and TerMaath, S. (2016) Optimization of Ventricular Catheter Design using High Performance Computing. American Society of Mechanical Engineers Fluids Engineering Division Summer Meeting (ASME FEDSM), Washington, DC, July 10-14.
28. Timilsina, R. and TerMaath, S. (2016) A parametric study of surface roughness and bonding mechanisms of aluminum alloys with epoxies: a molecular dynamics simulation. in American Physical Society Meeting Abstracts.
29. TerMaath, S. and Timilsina, R. (2016) Sensitivity Analysis of Composite Patch Design Parameters under Low Velocity Impact Loading Conditions. 57<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, San Diego, CA, Jan 2016.
30. Sproul, A. and TerMaath, S. (2015) Investigation of Composite Patch Modeling Techniques for Low-Velocity Impact Loading Conditions. 56<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Orlando, FL, AIAA 2015-2064.
31. TerMaath, S. (2014) Probabilistic Multi-Scale Damage Tolerance Modeling of Composite Patches for Naval Aluminum Alloys. Naval Surface Warfare Center Carderock Division Visiting Summer Faculty Presentation, Potomac, MD, July.
32. TerMaath, S. (2014) A Multi-Disciplinary Approach to Improved Trauma Care. Institute of Biomedical Engineering Annual Symposium, University of Tennessee, Knoxville, April.
33. TerMaath, S. (2014) Common Modeling and Simulation Errors: How to Identify and Prevent Them. ASCE Continuing Education Seminar, Knoxville, TN, March.

34. Goodmiller, G. and TerMaath, S. (2014) Investigation of Composite Patch Performance under Impact Loading. 55<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, AIAA 2014-0692.
35. Weigand, J. and TerMaath, S. (2014) Sensitivity Analysis of Out-of-Plane Composite Lamina Properties Relative to Configuration and Constitutive Properties. 55<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, National Harbor, MD, AIAA 2014-1373.
36. TerMaath, S. (2013) Protective Design of Structures. Tennessee Structural Engineers Association (TNSEA) East Region Winter 2013 Technical Seminar, Knoxville, TN, Feb.
37. TerMaath, S. (2012) Damage Modeling for Efficient Design. American Society of Civil Engineers (ASCE) Knoxville Branch Fall Seminar, Knoxville, TN, Aug.
38. TerMaath, S. (2008) Integration of High Fidelity Analysis with Nuclear Capabilities Services for the Evaluation of Nuclear Weapons Effects. 4<sup>th</sup> Joint DoD/DoE Nuclear Survivability/ Weapons Effects Modeling and Simulation Workshop, Huntsville, AL, Dec.
39. TerMaath, S. (2008) The Material Point Method for Analysis of Hybrid Structures under Blast and Fragment Loading. Boeing 10<sup>th</sup> Unitized Structures Interchange, San Antonio, TX, Dec.
40. TerMaath, S. (2008) Validation of Nuclear Capabilities Services with High Fidelity Analysis. Applied Research Associates Engineering and Science Symposium, Orlando, FL, May.
41. TerMaath, S. (2007) The Mechanical Response of a HE Simulant during Projectile Penetration. International Symposium on Interaction of the Effects of Munitions with Structures (ISIEMS) 12.1, Orlando, FL Sept.
42. TerMaath, S. (2006) An Integrated Design Framework for Unitized Structures,” Boeing 9<sup>th</sup> Unitized Structures Interchange, Palm Springs, CA, Dec.
43. TerMaath, S. (2006) Penetrator Technology for Predicting Damage to Unitized Structures Due to Fragment Impact. Boeing 8<sup>th</sup> Unitized Structures Interchange, San Antonio, TX, Dec.
44. TerMaath, S. (2006) Protective Design of Structures. Society of American Military Engineers, Fort Worth, TX, July.
45. TerMaath, S. (2006) Joint Strike Fighter Airframe Durability and Damage Tolerance Certification. Applied Research Associates, Inc. Engineering and Science Symposium, Denver, CO, May.
46. Ball, D., Norwood, S., and TerMaath, S. (2006) Joint Strike Fighter Airframe Durability and Damage Tolerance Certification. 46<sup>th</sup> AIAA Structures, Structural Dynamics, and Materials Conference.
47. TerMaath, S. (2005) Modeling, Simulation, and Probabilistic Mechanics Technology for Optimizing Unitized Structures Implementation. Boeing 7<sup>th</sup> Unitized Structures Technical Interchange, Dallas, TX, Nov.
48. TerMaath, S. (2005) A Solution for Interacting Kinked and Branched Cracks. 46<sup>th</sup> AIAA Structures, Structural Dynamics, and Materials Conference, Austin, TX, April.
49. TerMaath, S. (2003) An Analytical Technique for Determining Multiple Site Damage Propagation. Seventh Joint DOD/FAA/NASA Conference on Aging Aircraft, New Orleans, LA, Sept.
50. TerMaath, S. (2001) Unitized Metallic Structure for USAF Sustainment,” United States Air Force Aircraft Structural Integrity Program, Williamsburg, VA, Dec.
51. TerMaath, S. (2001) An Analytical Technique for Studying Interacting Branched Cracks in a Plate,” 10<sup>th</sup> International Congress on Fracture, Honolulu, Hawaii, Dec.
52. TerMaath, S. (2001) An Analytical Method for Studying Multiple Crack Arrays,” 33<sup>rd</sup> ASTM National Symposium on Fatigue and Fracture Mechanics, Moran, Wyoming, June.
53. TerMaath, S. (1999) New Computational Technique for Treating Fracture in 2D Brittle Materials with Many Interacting Kinked and Branched Cracks,” 36<sup>th</sup> Annual Technical Meeting, Society of Engineering Science, Austin, TX, 1999.
54. TerMaath, S. (1999) Analysis of Multiple Kinked and Branched Cracks in a Plate Following Paths Along a Hexagonal Network. 31<sup>st</sup> ASTM National Symposium on Fatigue and Fracture Mechanics, Cleveland, OH, June 1999 (*Best Student Paper Presentation Award*).

55. TerMaath, S. (1998) A Computational Fracture Mechanics Approach for the Analysis of Facesheet-from-Core Disbond of Honeycomb Core Sandwich Panels. 30<sup>th</sup> ASTM National Symposium on Fatigue and Fracture Mechanics, St. Louis, MO, June (*Best Student Paper Presentation Award*).
56. TerMaath, S. (1998) Simulating Disbond in Honeycomb Core Panels,” 12<sup>th</sup> ASCE Engineering Mechanics Conference, La Jolla, CA, May.