

**WILLIAM P. SCHONBERG, PhD, PE, DS**  
**Fellow, ASCE; Fellow, ASME; Associate Fellow, AIAA**  
Civil, Architectural, and Environmental Engineering Department  
Missouri University of Science and Technology  
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## EDUCATION

*NORTHWESTERN UNIVERSITY*                      1983-1986                      *EVANSTON, ILLINOIS*  
Doctor of Philosophy in Civil Engineering; August, 1986. Dissertation: "Static and Dynamic Indentation of Transversely Isotropic Beams and Plates" (*conferred June, 1987*).

*NORTHWESTERN UNIVERSITY*                      1981-1983                      *EVANSTON, ILLINOIS*  
Master of Science in Civil Engineering; June, 1983. Thesis: "Modal Superposition Methods in Seismic Soil-Structure Interaction".

*PRINCETON UNIVERSITY*                      1977-1981                      *PRINCETON, NEW JERSEY*  
Bachelor of Science in Civil Engineering (cum laude); June, 1981. Thesis: "Dynamic Response Characteristics of Embedded Tower-Foundation Systems".

## LANGUAGES

(in addition to English)

Russian

French

## HONORS AND AWARDS

### International

- Fulbright Distinguished Chair, Advanced Science & Technology, US State Department, 2018.
- Distinguished Scientist Award, Hypervelocity Impact Society, 2015.
- Fraunhofer Bessel Research Award, Humboldt Foundation, 2007.
- Best Oral Presentation, HVIS2005, Hypervelocity Impact Society, 2005.
- Charles Sharpe Beecher Prize, Institute of Mechanical Engineers, Aerospace Division, England, 1999 (Awarded in April 2000 for the paper entitled, "Onset of Petalling in a Thin Spacecraft Wall Perforated by an Orbital Debris Particle.")

### National

- Group Achievement Award, NASA Engineering and Safety Center (NESC), 2014 (in recognition of outstanding accomplishment through the coordination of individual efforts that have contributed substantially to the success of NESC's mission).
- 3<sup>rd</sup> Place, New Engineering Educators Division Best Paper Competition, ASEE Annual Meeting, 2011.
- Honor Award, NASA Engineering and Safety Center (NESC), 2010 (for outstanding leadership, technical insight and support of micrometeoroid and orbital debris protection and damage prediction analysis for the NESC).

- Fellow, American Society of Mechanical Engineers, 2005.
- Fellow, American Society of Civil Engineers, 2003.
- Associate Fellow, American Institute of Aeronautics and Astronautics, 1998.
- Lawrence Sperry Award, AIAA, January, 1995 (Awarded for a notable contribution made by a young person to the advancement of aeronautics or astronautics.)

### **Regional / Local**

- Young Engineer of the Year Award, AIAA, Alabama-Mississippi Section, 1990.
- Certificate of Recognition, NASA/ASEE, 1995, 1994, 1988, 1987
- Certificate of Recognition, Huntsville Association of Technical Societies, 1993.

### **University**

- Manuel T. Pacheco Academic Leadership Award, University of Missouri System, 2007 (This award honors an academic administrator who exemplifies outstanding academic leadership at one of the four institutions within the University of Missouri System.)
- Honorary Knight of St. Patrick, Missouri S&T, 2006.
- Elevated to Chapter Honor Member, Chi Epsilon, University of Missouri-Rolla, 2000.
- Outstanding Research and Creativity Award, University of Alabama Huntsville, 1992.
- Outstanding Engineering Faculty Member Award, College of Engineering, University of Alabama in Huntsville, 1990.
- Certificate of Appreciation, American Society of Civil Engineers Student Club, University of Alabama in Huntsville, 1988.

### **Other**

- Semi-Finalist, Intel/Westinghouse Science Talent Search Competition, 1977.
- Gordon Woulff Mathematics Team Award, Bronx High School of Science, 1977.
- National Honor Roll, Mathematics Association of America Competition, 1977.
- Honorable Mention, Otto P. Burgdorf Science Conference, NY Academy of Sciences, 1977.
- Certificat d'Honneur, Concours National de Francais, Association Americaine des Professeurs de Francais, 1976.
- Bronze Medal, Greater New York Mathematics Fair, 1976.

## **LEADERSHIP AND DEVELOPMENT TRAINING**

- Getting More Done with Less: Coaching Faculty, Staff, and Students to Greater Success, Carolyn Sullivan, JD, New Chapter Coaching, University of Missouri, Leadership Development Program, Columbia, Missouri, September, 2018.
- Understanding the University Budget Structure, University of Missouri, Leadership Development Program, Columbia, Missouri, September, 2016.
- Missouri S&T Supervisor Training, Missouri University of Science and Technology, Rolla, Missouri, October – December, 2014.
  - First Time Managers: Understanding a Manager's Role
  - Meeting Expectations and Challenges
  - Cross-Cultural Managing: Managing Workforce Generations, Conflict, and Diversity
  - Communicating with a Cross-Cultural Audience

- Protecting Your Intellectual Property and Proprietary Information: How to Avoid Conflict with Federal Laws, Missouri University of Science and Technology, Rolla, Missouri, January, 2013.
- Leadership and High Performance, University of Missouri, Leadership Development Program, Columbia, Missouri, September, 2012.
- Safe Space/Ally Training, Missouri University of Science and Technology, Rolla, Missouri, March, 2012.
- Reframing Academic Leadership, University of Missouri, Leadership Development Program, Columbia, Missouri, September, 2011.
- Women in the Academy: Leveling the Playing Field, University of Missouri – St. Louis, Gender Studies Program, St. Louis, Missouri, May, 2011.
- Inspiring Trust, University of Missouri Leadership Development Program, Rolla, Missouri, March, 2011.
- Improving the Recruitment of Women in Science and Engineering Seminar and Workshop, UMR Women’s Leadership Institute, Rolla, Missouri, September, 2004.
- University of Missouri Leadership Development Program, UM System, October 2000.

## **PROFESSIONAL POSITIONS**

### *DEFENSE SCIENCE AND TECHNOLOGY GROUP* *MELBOURNE, AUSTRALIA*

- Fulbright Distinguished Chair in Advanced Science & Technology, January 2019 to July 2019.

### *ROYAL MELBOURNE INSTITUTE OF TECHNOLOGY* *MELBOURNE, AUSTRALIA*

- Visiting Professor, School of Engineering, College of Engineering, Science, and Health, January 2019 to July 2019.

### *MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY* *ROLLA, MISSOURI*

- Professor, Civil, Architectural, and Environmental Engng Dept, August, 1999 to present.
- Assistant Chair for Distance Education and Remote Programs, Civil, Architectural, and Environmental Engineering Department, January 2016, to present.
- Chair, Civil, Architectural, and Environmental Engineering Department, August, 1999 to September, 2015.
- Interim Chair, Interdisciplinary Engineering Department, January 2009 to August 2009.
- Interim Dean, School of Engineering, September, 2006 to May, 2007.

### *CALIFORNIA INSTITUTE OF TECHNOLOGY* *PASADENA, CALIFORNIA*

- Summer Faculty Fellow, NASA/Jet Propulsion Laboratory, May, 2016 to August, 2016; and, June, 2014 to August, 2014.

### *UNIVERSITY COLLEGE OF THE CAYMAN ISLANDS* *GRAND CAYMAN, B.W.I.*

- Visiting Professor, Department of Engineering and Computer Science, January to May, 2014.

### *FRAUNHOFER ERNST MACH INSTITUTE* *FREIBURG, GERMANY*

- Visiting Professor, Humboldt Foundation Friedrich Wilhelm Bessel Research Award winner, June, 2007 to December, 2007.

*CALIFORNIA INSTITUTE OF TECHNOLOGY*

*PASADENA, CALIFORNIA*

- Summer Faculty Fellow, NASA/Jet Propulsion Laboratory, June, 2006 to August, 2006.

*UNIVERSITY OF ALABAMA IN HUNTSVILLE*

*HUNTSVILLE, ALABAMA*

- Professor, Civil and Environmental Engineering Department, Sept, 1994 to August, 1999.
- Chair, Civil and Environmental Engineering Department, September, 1995 to August, 1999.
- Associate Professor, Civil and Environmental Engineering Department, September, 1992 to August, 1994.
- Associate Professor, Civil Engineering Program, Mechanical and Aerospace Engineering Department, September, 1990 to August, 1992.
- Assistant Professor, Civil Engineering Program, Mechanical and Aerospace Engineering Department, September, 1986 to August, 1990.

*GEORGE C. MARSHALL SPACE FLIGHT CENTER*

*HUNTSVILLE, ALABAMA*

- NASA/ASEE Summer Faculty Fellow, June 1995 - August 1995; June 1994 - August 1994.

*USAF WRIGHT LABORATORIES*

*EGLIN AFB, FLORIDA*

- AFOSR Summer Faculty Fellow, June 1993 - August 1993; June 1992 - August 1992.

*GEORGE C. MARSHALL SPACE FLIGHT CENTER*

*HUNTSVILLE, ALABAMA*

- NASA/ASEE Summer Faculty Fellow, June 1988 - August 1988; June 1987 - August 1987.

**REFEREED JOURNAL PUBLICATIONS**

Schonberg, W.P., “Rupture of a Cryogenic Composite Overwrapped Pressure Vessel Following a High-Speed Particle Impact”, *Aerospace*, Vol. 5, 2018, Paper No. 20.

Schonberg, W.P., “A Rupture Limit Equation for Pre-Loaded Composite Plates”, *Journal of Composites Science*, Vol. 2, 2018, Paper No. 3.

Schonberg, W.P., and Williamsen, J.E., “Calculating Hole Size and Crack Length in Multi-wall Systems Following an Orbital Debris Impact”, *International Journal of Impact Engineering*, Vol. 109, 2017, pp. 335-341.

Schonberg, W.P., “Concise History of Ballistic Limit Equations for Multi-Wall Spacecraft Shielding”, *Reviews in Human Space Exploration*, Vol. 1, No. 1, 2016, pp. 46-54.

Asareh, M., Schonberg, W.P., and Volz, J., “Fragility Analysis of a 5-MW NREL Wind Turbine Considering Aero-Elastic and Seismic Interaction Using Finite Element Method”, *Finite Elements in Analysis and Design*, Vol. 120, 2016, pp. 57–67.

Schonberg, W.P., and Jenkin, A.B., “A Comment on the Reimerdes Ballistic Limit Equation for Dual-Wall Structural Systems”, *Journal of Spacecraft and Rockets*, Vol. 53, 2016, No. 3, pp. 584-586.

Schonberg, W.P., and Hull, S., “MMOD Impact of Pressurized Tanks: A Comment on Current Design Criteria”, *ASCE Journal of Aerospace Engineering*, Vol. 29, 2016, No. 3, pp. 06016-004/1-4.

Asareh, M., Prowell, I., Schonberg, W.P., and Volz, J., “A Computational Platform for Considering the Effects of Aerodynamic and Seismic Load Combination for Utility Scale Horizontal Axis Wind Turbines”, *Earthquake Engineering and Engineering Vibration*, Vol. 15, 2016, pp. 91-102.

Schonberg, W.P., “Using Modified Ballistic Limit Equations in Spacecraft Risk Assessments”, *Acta Astronautica*, Vol. 126, 2016, pp. 199-204.

Asareh, M., Schonberg, W.P., and Volz, J., “Effects of Seismic and Aerodynamic Load Interaction on Structural Dynamic Response of Multi-megawatt Utility Scale Horizontal Axis Wind Turbines”, *Renewable Energy Journal*, Vol. 86, 2016, pp. 49-58.

Schonberg, W.P., and Ratliff, J.M., “Hypervelocity Impact of a Pressurized Vessel: Comparison of Ballistic Limit Equation Predictions with Test Data and Rupture Limit Equation Development”, *Acta Astronautica*, Vol. 115, 2015, pp. 400-406.

Schonberg, W.P., Evans, S., and Bjorkman, M.D., “Hypervelocity Impact Testing of Multi-Wall Targets Using Multiple Simultaneously Launched Projectiles”, *Journal of Spacecraft and Rockets*, Vol. 50, No. 2, 2013, pp. 358-364.

Williamsen, J.E., Schonberg, W.P., and Evans, H.J., “Generic Module Wall Damage Prediction Equations for Habitable Spacecraft Crew Survivability Evaluations”, *International Journal of Impact Engineering*, Vol. 56, 2013, pp. 71-81.

Williamsen, J.E., Schonberg, W.P., and Jenkin, A.B., “On the Effect of Considering More Realistic Particle Shape and Mass Parameters in MMOD Risk Assessments”, *Advances in Space Research*, Vol. 47, 2011, pp. 1006–1019.

Schonberg, W.P., “Protecting Earth-orbiting Spacecraft against Micro-Meteoroid/Orbital Debris Impact Damage Using Composite Structural Systems and Materials: An Overview”, *Advances in Space Research*, Vol. 45, 2010, pp. 709-720.

Schonberg, W.P., Schaefer, F., and Putzar, R., “Hypervelocity Impact Response of Honeycomb Sandwich Panels”, *Acta Astronautica*, Vol. 66, 2010, pp. 455-466.

Schonberg, W.P., Schaefer, F., and Putzar, R., “Some Comments on the Protection of Lunar Habitats Against Damage from Meteoroid Impacts”, *ASCE Journal of Aerospace Engineering*, Vol. 33, No. 1, 2010, pp. 90-97.

Schonberg, W.P., Schaefer, F., and Putzar, R., “Predicting the Perforation Response of Honeycomb Sandwich Panels Using Ballistic Limit Equations,” *Journal of Spacecraft and Rockets*, Vol. 46, No. 5, 2009, pp. 976-981.

Schonberg, W.P., and Compton, L.E., "Application of the NASA/JSC Whipple Shield Ballistic Limit Equations to Dual-Wall Targets under Hypervelocity Impact", *International Journal of Impact Engineering*, Vol. 35, 2008, pp. 1792-1798.

Williamsen, J.E., Schonberg, W.P., Evans, H., and Evans, S., "A Comparison of NASA, DoD, and Hydrocode Spherical and Non-spherical Ballistic Limit Predictions for Dual-Wall Targets and Their Effect on Spacecraft Risk", *International Journal of Impact Engineering*, Vol. 35, 2008, pp. 1870-1877.

Schonberg, W.P., and Williamsen, J.E., "RCS-Based Ballistic Limit Curves for Non-Spherical Projectiles Impacting Dual-Wall Spacecraft Systems", *International Journal of Impact Engineering*, Vol. 33, 2006, pp. 763-770.

Singh, M., and Schonberg, W.P., "Bonded Composite Patch Design for Aircraft Structures Exhibiting Cracking and Corrosion", *Journal of Aircraft*, Vol. 42, No. 1, 2005, pp. 269-274.

Myers, B.A., Schonberg, W.P., and Williamsen, J.E., "Temperature Effects on Bumper Hole Diameter for Impact Velocities from 2 to 7 km/s", *International Journal of Impact Engineering*, Vol. 29, 2003, pp. 487-496.

Hu, K., and Schonberg, W.P., "Ballistic Limit Curves for Non-Spherical Projectiles Impacting Dual-Wall Systems", *International Journal of Impact Engineering*, Vol. 29, 2003, pp. 345-356.  
Depczuk, D. and Schonberg, W.P., "Characterizing the Debris Clouds Created in an Oblique Orbital Debris Particle Impact", *Journal of Aerospace Engng*, Vol. 16, No. 4, pp. 177-190, 2003.

Kruse, G.R., and Schonberg, W.P., "A Non-Isotropic Model of Microdebris From Impacts With Complex Targets", *AIAA Journal*, Vol. 40, No. 11, pp.2345-2353, 2002.

Sayyah, T. and Schonberg, W.P., "A New Failure Criterion for Space Shuttle Main Engine Turbine Blades", *Journal of Spacecraft and Rockets*, Vol. 39, No. 1, 2002, pp.140-145.

Zhou, M., and Schonberg, W.P., "Smooth Static and Dynamic Indentation of a Cantilever Beam", *International Journal of Solids and Structures*, Vol. 39, 2002, pp. 297-310.

Schonberg, W.P., "Protecting Spacecraft against Meteoroid/Orbital Debris Impact Damage: An Overview", *Space Debris*, Vol. 1, 2001, pp. 195-210.

Schonberg, W.P., "Characterizing Secondary Debris Impact Ejecta", *International Journal of Impact Engineering*, Vol. 26, 2001, pp. 713-724.

Zhou, M., and Schonberg, W.P., "Smooth Asymmetric Two-Dimensional Indentation of a Finite Elastic Beam", *Journal of Applied Mechanics*, Vol. 68, No. 1, 2001, pp. 357-360.

Schonberg, W.P., "Protecting Spacecraft Against Orbital Debris Impact Damage Using Composite Materials", *Composites Part A-Applied Science & Manufacturing*, Vol. 31, No. 8,

2000, pp. 869-878.

Schonberg, W.P., "Energy Partitioning in High Speed Impact of Analog Solid Rocket Motors", *The Aeronautical Journal*, Vol. 103, No. 1029, 1999, pp. 519-527.

Williamsen, J.E., Evans, H.A., and Schonberg, W.P., "Effect of Multi-Wall System Composition on Survivability for Spacecraft Impacted by Orbital Debris", *Space Debris*, Vol. 1, No. 1, 1999, pp. 37-43.

Schonberg, W.P., and Williamsen, J.W., "Modeling Damage in Spacecraft Impacted by Orbital Debris Particles", *Journal of Astronautical Sciences*, Vol. 47, No. 1&2, 1999, pp. 103-115.

Schonberg, W.P., "Hole Size and Crack Length Models for Spacecraft Walls under Oblique Hypervelocity Projectile Impact", *Aerospace Science and Technology*, Vol. 3, 1999, pp. 461-471.

Schonberg, W.P. and Mohamed, E., "Analytical Hole Size and Crack Length Models for Multi-Wall Systems under Hypervelocity Projectile Impact", *International Journal of Impact Engineering*, Vol. 23, 1999, pp. 835-846.

Schonberg, W.P. and Ebrahim, A., "Modelling Oblique Hypervelocity Impact Phenomena Using Elementary Shock Physics", *International Journal of Impact Engineering*, Vol. 23, 1999, pp. 823-834.

Schonberg, W.P., "Onset of Petaling in a Thin Spacecraft Wall Perforated by an Orbital Debris Particle", *Proceedings of the Institution of Mechanical Engineers, Part G (Journal of Aerospace Engineering)*, Vol. 212, 1998, pp. 407-414 [**awarded Charles Sharpe Beecher Prize from IMechE / Aerospace Division, UK**].

Triplett, M.H., and Schonberg, W.P., "Static and Dynamic Finite Element Analysis of Honeycomb Sandwich Structures", *Structural Engineering and Mechanics*, Vol. 6, No. 1, 1998, pp. 95-114.

Jolly, W.H., and Schonberg, W.P., "Analytical Prediction of Hole Size Due to Hypervelocity Impact of Spherical Projectiles", *Shock and Vibration*, Vol. 4., Nos. 5-6, 1997, pp. 379-390.

Schonberg, W.P., and Williamsen, J.E., "Empirical Hole Size and Crack Length Models for Dual-Wall Systems under Hypervelocity Projectile Impact", *International Journal of Impact Engineering*, Vol. 20, 1997, pp. 711-722.

Schonberg, W.P., and Williamsen, J.E., "Cracking Characteristics of Dual-Wall Structures Following Simulated Orbital Debris Particle Impact", *Journal of Spacecraft and Rockets*, Vol. 34, No. 3, 1997, pp. 318-324.

Schonberg, W.P., "Using Composite Materials to Protect Spacecraft Against Orbital Debris Impact Damage", *Key Engineering Materials*, Vols. 141-143, Part 2, 1997, pp. 573-584.

Schonberg, W.P., Serrano, J., and Williamsen, J.E., "An Internal Effects Model for a Habitable Spacecraft Module Perforated by an Orbital Debris Particle", *Journal of Spacecraft and Rockets*, Vol. 34, No. 3, 1997, pp. 325-333.

Vaughan, R.E., and Schonberg, W.P., "An Inelastic Analysis of a Welded Aluminum Joint", *Metallurgical and Materials Transactions*, Vol. 26B, 1995, pp. 1253-1261.

Schonberg, W.P., "A Comparison of Fragmentation Models", *International Journal of Impact Engineering*, Vol. 17, 1995, pp. 739-750.

Schonberg, W.P., "Debris Cloud Material Characterization for Hypervelocity Impacts of Single- and Multi-Material Projectiles on Thin Target Plates", *Shock and Vibration*, Vol. 2, No. 4, 1995, pp. 273-287.

Zhou, M., and Schonberg, W.P., "Rotation Effects in the GLOBAL/LOCAL Analysis of Cantilever Beam Contact Problems", *Acta Meccanica*, Vol. 108, 1995, pp. 49-62.

Schonberg, W.P., "Effect of Multi-Layer Insulation Thickness and Location on the Hypervelocity Impact Response of Dual-Wall Structures", *Acta Astronautica*, V. 32, No. 9, 1994, pp. 577-589.

Schonberg, W.P., and Cooper, D., "Repeatability and Uncertainty Analysis of NASA/MSFC Light Gas Gun Test Data", *AIAA Journal*, Vol. 32, No. 5, 1994, pp. 1058-1065.

Zhou, M., and Schonberg, W.P., "A Comment on the GLOBAL/LOCAL Method in the Analysis of Low Velocity Impact Problems", *Journal of Engineering Mechanics*, Vol. 120, No. 5, 1994, pp. 1042-1056.

Schonberg, W.P., and Walker, E.J., "Hypervelocity Impact of Dual-Wall Structures with Graphite/Epoxy Inner Walls", *Composites Engineering*, Vol. 4, No. 10, 1994, pp. 1045-1054.

Celestian, J.P., and Schonberg, W.P., "Dynamic Response of the Space Station Freedom to a Module Perforation by a Hypervelocity Impact", *International Journal of Impact Engineering*, Vol. 13, No. 2, 1993, pp. 353-365.

Schonberg, W.P., and Peck, J.A., "Parametric Investigation of Multi-Wall Structural Response to Hypervelocity Cylindrical Projectile Impact", *Computers and Structures*, Vol. 49, No. 4, 1993, pp. 719-746.

Schonberg, W.P., and Yang, F., "Predicting the Response of Space Structures to Orbital Debris Particle Impact", *International Journal of Impact Engineering*, Vol. 14, 1993, pp. 647-658.

Peck, J.A., and Schonberg, W.P., "Asymmetric Indentation of a Finite Elastically Supported Beam", *Journal of Applied Mechanics*, Vol. 60, No. 4, 1993, pp. 1039-1045.



Schonberg, W.P., "Effect of Internal Stress Fields on the Perforation Response of Dual-Wall Structures under Hypervelocity Impact", *International Journal of Impact Engineering*, Vol. 14, 1993, pp. 637-646.

Schonberg, W.P., and Peck, J.A., " Multi-Wall Structural Response to Hypervelocity Projectile Impact: Numerical Predictions vs Experimental Results", *International Journal of Impact Engineering*, Vol. 13, No. 1, 1993, pp. 117-132.

Schonberg, W.P., Bean, A.J., and Darzi, K., "An Analysis of Dual-Wall Structures Under Hypervelocity Projectile Impact", *Journal of Ballistics*, Vol. 11, No. 1, 1992, pp. 1-44.

Schonberg, W.P., "Aluminum 2219-T87 and 5456-H116: A Comparative Study of Pressure Wall Materials in Dual-Wall Structures Under Hypervelocity Impact", *Acta Astronautica*, Vol. 26, No. 11, 1992, pp. 799-812.

Schonberg, W.P., and Darzi, K., "Effect of Projectile Shape and Material on the Hypervelocity Impact Response of Aluminum Dual-Wall Structures", *Journal of Aerospace Engineering*, Vol. 5, No. 4, 1992, pp. 405-424.

Schonberg, W.P., and Walker, E.J., "Use of Composite Materials in Multi-Wall Structures to Prevent Perforation by Hypervelocity Projectiles", *Composite Struct*, Vol. 19, 1991, pp. 15-40.

Schonberg, W.P., and Bean, A.J., "Hypervelocity Impact Response of Multi-Wall Structures", *Acta Astronautica*, Vol. 25, No. 7, 1991, pp. 363-373.

Schonberg, W.P., and Tullos, R., "Spacecraft Wall Design for Increased Protection against Penetration by Space Debris Impacts", *AIAA Journal*, Vol. 29, No. 12, 1991, pp. 2207-2214.

Schonberg, W.P., "Hypervelocity Projectile Impact of Spacecraft Windows", *Journal of Spacecraft and Rockets*, Vol. 28, No. 1, 1991, pp. 118-123.

Schonberg, W.P., "Hypervelocity Impact Response of Spaced Composite Material Structures", *International Journal of Impact Engineering*, Vol. 10, 1990, pp. 509-523.

Schonberg, W.P., Beasley, P.A., Guinn, G.R., and Bean, A.J., "Static Testing of U-Shaped Formed Metal Bellows", *International Journal of Pressure Vessels and Piping*, Vol. 41, No. 2, 1990, pp. 207-226.

Schonberg, W.P., and Taylor, R.A., "Exterior Spacecraft Subsystem Protective Shielding Analysis and Design", *Journal of Spacecraft and Rockets*, Vol. 27, No. 3, 1990, pp. 267-274.

Schonberg, W.P., "Hypervelocity Impact Penetration Phenomena in Aluminum Space Structures", *Journal of Aerospace Engineering*, Vol. 3, No. 3, 1990, pp. 174-185.

Schonberg, W.P., "Predicting the Low Velocity Impact Response of Finite Beams", *International Journal of Impact Engineering*, Vol. 8, No. 2, 1989, pp. 87-97.

Schonberg, W.P., and Taylor, R.A., "Penetration and Ricochet Phenomena in Multi-Sheet Structures under Oblique Hypervelocity Impact", *AIAA Journal*, Vol. 27, 1989, pp. 639-646.

Schonberg, W.P., "A Correlative Study between Analysis and Experiment on the Low Velocity Impact of Finite Beams", *International Jnl of Engineering Science*, Vol. 27, 1989, pp. 187-192.

Schonberg, W.P., Keer, L.M., and Woo, T.K., "Low Velocity Impact of Transversely Isotropic Beams and Plates", *International Journal of Solids and Structures*, Vol. 23, 1987, pp. 871-896.

Keer, L.M., and Schonberg, W.P., "Smooth Indentation of a Transversely Isotropic Cantilever Beam", *International Journal of Solids and Structures*, Vol. 22, No. 9, 1986, pp. 1033-1053.

Keer, L.M., and Schonberg, W.P., "Smooth Indentation of an Isotropic Cantilever Beam", *International Journal of Solids and Structures*, Vol. 22, No. 1, 1986, pp. 87-106.

### **Short Communications**

Schonberg, W.P., Closure to Discussion by D. Weihs on "Hypervelocity Impact Penetration Phenomena in Aluminum Space Structures" (Schonberg, W., *Journal of Aerospace Engineering*, Vol. 3, No. 3, 1990), *Journal of Aerospace Engineering*, Vol. 5, No. 2, 1992, pp. 258-259.

### **INVITED PAPERS AND PRESENTATIONS**

Schonberg, W.P., "Is It Engineering? Is It Art? Is It Both? Does It Matter?" *2018 STEM Carib Conference*, University College of the Cayman Islands, Grand Cayman, BWI, October, 2018.

Schonberg, W.P., "Heavens! What a Mess! The Growing Problem of Space Debris", *2018 STEM Carib Conference*, University College of the Cayman Islands, Grand Cayman, BWI, October, 2018.

Schonberg, W.P., "Large Satellite Constellations – Astronomer's Friend or Foe?" *Wm Hrudehy / CARINA Carribean Astronomy Conference*, Grand Cayman, BWI, May, 2018.

Schonberg, W.P., "Be the Bridge: An Exploration of Physical as well as Metaphorical Bridges", *TedxUCCI*, University College of the Cayman Islands, Grand Cayman, BWI, March, 2018 (<https://www.youtube.com/watch?v=nJ3h9CIW9ZI>).

Schonberg, W.P., "Rupture of Cryogenic Fuel Tanks and Other HVI Studies", *The 2017 Hypervelocity Impact Symposium*, Canterbury, Kent, England, April, 2017.

Schonberg, W.P., "The Importance of a Global Technological Education", *TedxMissouriS&T*, Missouri University of Science and Technology, Rolla, MO, April, 2017 (<https://www.tedxmissouri.com/live-stream>; starting at 1:48:50).

Schonberg, W.P., "Technological Literacy in a Global Society", *TedxUCCI*, University College

of the Cayman Islands, Grand Cayman, BWI, March, 2016 (<https://www.youtube.com/watch?v=ws9KpyQ31mU>).

Schonberg, W.P., “Studies of Hypervelocity Impact Phenomena as Applied to the Protection of Spacecraft Operating in the MMOD Environment”, *Distinguished Scientist Award Keynote Address, The 2015 Hypervelocity Impact Symposium*, Boulder, Colorado, April, 2015.

Schonberg, W.P., “MOOCs: Are They the End of the World as We Know It?”, *2013 STEM Carib Conference*, University College of the Cayman Islands, Grand Cayman, October, 2013.

Schonberg, W.P., “Heavens! What a Mess!”, *Plenary Presentation, 2013 STEM Carib Conference*, University College of the Cayman Islands, Grand Cayman, BWI, October, 2013.

Schonberg, W.P., “Assessing the Resiliency of Composite Structural Systems and Materials Used in Earth-Orbiting Spacecraft to Hypervelocity Projectile Impact”, *Scientific Seminar in Honor of Prof. Klaus Thoma*, Fraunhofer Ernst-March-Institut, Freiburg, Germany, September, 2009.

Schonberg, W.P., “An Overview of Satellite Protection Principles and Hazard Mitigation Techniques”, *Proceedings of the Leonid Meteoroid Storm and Satellite Threat Conference II*, Manhattan Beach, California, May, 1999.

Williamsen, J.E., and Schonberg, W.P., “Empirical Models for Spacecraft Damage from Orbital Debris Penetration and Effects on Spacecraft Survivability”, Paper No. 3.09, *Proceedings of the 2<sup>nd</sup> European Conference on Space Debris*, Darmstadt, Germany, March, 1997.

Schonberg, W.P., and Williamsen, J.E., “Hole Size and Crack Length Following Orbital Debris Penetration of Space Station Module Walls at 6.5 and 11.3 km/s”, Paper No. 96-m-20v, *Proceedings of the 20<sup>th</sup> Int’l Symp on Space Technology and Science*, Gifu, Japan, May, 1996.

## SCHOLARLY MONOGRAPH CHAPTERS

Schonberg, W.P., Dittmer, J., and Skibiski, K., “Enhancing Ethical Awareness in Future Generations of Engineers”, in *Emerging Frontiers in Industrial and Systems Engineering: Growing Research and Practice*, H.B. Nembhard, E. Cudney, and K. Coperich, eds., Institute of Industrial and Systems Engineers, Georgia, 2019 (*in press*).

Schonberg, W.P., “Emerging Tertiary Education Opportunities and Challenges in the Caribbean and Around the World”, in *The Caribbean in a Changing World: Surveying the Past, Mapping the Future*, L. Smith, S. Fullerton-Cooper, E. Gordon, and A. Bodden, eds., Cambridge Scholars Publishing House, 2017 (*invited*).

Schonberg, W.P., Putzar, R., and Schaefer, F., “Lunar Habitat Protection against Meteoroid Impact Damage”, in *Lunar Settlements*, H. Benaroya, ed., CRC Press, 2010 (*invited*).

Schonberg, W.P., “Assessing the Resiliency of Composite Structural Systems and Materials

Used in Earth-Orbiting Spacecraft to Hypervelocity Projectile Impact” in Predictive Modeling of Dynamic Processes, S. Hiermaier, *ed.*, Springer Verlag, 2009 (invited).

### **PUBLISHED CONFERENCE PROCEEDINGS**

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Schonberg, W.P., Cracking Characteristics of a Habitable Module Pressure Wall Following Orbital Debris Penetration, Final Report, 1994 NASA/ASEE Summer Faculty Fellowship Program, Marshall Space Flight Center, Alabama, September, 1994.

Schonberg, W.P., Debris Cloud Material Characterization for Hypervelocity Impacts of Single- and Multi-Material Projectiles on Thin Target Plates, WL-TR-94-7039, Eglin Air Force Base, Florida, May, 1994.

Schonberg, W.P., A Study of Hypervelocity Impact Fragmentation Algorithms, Final Report, Contract AFOSR-SREP-28, April, 1994.

Schonberg, W.P., Energy Partitioning in High Speed Impact of Analog Solid Rocket Motors, Final Report, Contract DASG60-89-C-0129-TE-12, April, 1994.

Schonberg, W.P., Toward a Characterization of the Debris Clouds Created in a Hypervelocity Impact, WL-TR-93-7028, Eglin Air Force Base, Florida, August, 1993.

Schonberg, W.P., and Cooper, D., Repeatability and Uncertainty of NASA/MSFC Light Gas Gun Test Data, NASA CR-192496, Marshall Space Flight Center, March 1993.

Schonberg, W.P., Predicting Multi-Wall Structural Response to Hypervelocity Impact Using the HULL Code, NASA CR-4486, Marshall Space Flight Center, January, 1993.

Schonberg, W.P., and Yang, F., Response of Space and Aerospace Structures To Hypervelocity Debris Particle Impact, Final Report, Engineering Foundation Research Initiation Grant RI-A-89-6, February, 1992.

Schonberg, W.P., Bean, A.J., and Darzi, K., Hypervelocity Impact Physics, NASA CR-4343, Marshall Space Flight Center, January, 1991.

Schonberg, W.P., and Petersen, M.E., Predicting the Low Velocity Impact Response of Composite Beams, Final Report, University of Alabama in Huntsville Research Inst., July, 1990.

Schonberg, W.P., Bean, A.J., and Darzi, K., Hypervelocity Impact Physics, Final Report, Contract NAS8-36955/D.O.16, July, 1990.

Schonberg, W.P., Beasley, P.A., Guinn, G.R., and Bean, A.J., Static Stress Studies of Formed Metal Bellows, Final Report, Contract NCC8-4, Marshall Space Flight Center, July, 1989.

Schonberg, W.P. and Taylor, R.A., Oblique Hypervelocity Impact Response of Dual-Sheet Structures, NASA TM-100358, Marshall Space Flight Center, February, 1989.

Schonberg, W.P., An Elementary Failure Analysis for Finite Beams Under Low Velocity Impact Loading, Final Report, University of Alabama in Huntsville Research Institute, December, 1988.

Schonberg, W.P., Dynamic Impact of Beams: A Correlation of Experimental Results and Analytical Theories, Final Report, U. of Alabama Huntsville Research Inst, February 1988.

Schonberg, W.P., Taylor, R.A., and Horn, J., An Analysis of Penetration and Ricochet Phenomena in Oblique Hypervelocity Impact, NASA TM-100319, Marshall Space Flight Center, February, 1988.

## **CONTRACTS AND GRANTS SUMMARY**

Missouri Department of Transportation, “Assessment and Repair of Corroded Steel H-Piles”; Co-Principal Investigator; December 2017 to July 2020; \$227,498; W.P. Schonberg: \$11,375.

Missouri University of Science & Technology, Online Course Development Grant; Principal Investigator; September 2016 to September 2017; \$5,000.

Missouri Department of Transportation, “Field Implementation of Rubberized Chip Seal”; Co-Principal Investigator; September 2017 to December 2018; \$54,167; W.P. Schonberg: \$2,708.

Missouri Department of Transportation, “Characterization and Performance of Zero-Cement Concrete for Longer Service Life of Bridges”; Co-Principal Investigator; October 2016 to April 2018; \$100,000; W.P. Schonberg: \$5,000.

U.S. Army Research Laboratory, “Compendium of Hypervelocity Impact Phenomena Research”; Principal Investigator; April 2015 to September 2015; \$24,801.

U.S. Army Research Office, “HVIS2015: The 2015 Hypervelocity Impact Symposium”; Principal Investigator; May 2015 to December 2015; \$7,500.

Missouri Department of Transportation, “Nondestructive Evaluation of MoDOT Bridge Decks - Pilot Study”; Co-Principal Investigator; August 2013 to March 2014; \$53,089 (W.P. Schonberg: \$2,124).

Missouri Department of Transportation, “Recycled Concrete Aggregate (RCA) for Infrastructure Elements”; Co-Principal Investigator; October 2012 to May 2014; \$129,999 (W.P. Schonberg: \$6,500).

U.S. Department of Transportation/NUTC, “Adding Faculty in Transportation Areas”; Co-Principal Investigator; July 2012 to December 2013; \$433,920 (W.P. Schonberg: \$216,960).

U.S. Department of Transportation/NUTC, “Advanced Moisture Modeling of Polymer Composites”; Co-Principal Investigator; February 2012 to August 2013; \$50,000 (W.P. Schonberg: \$12,500).

Missouri Department of Transportation, “Polyurethane Foam Infill for Fiber-Reinforced Polymer (FRP) Bridge Deck Panels”; Co-Principal Investigator; December 2011 to May 2014; \$119,999; W.P. Schonberg: \$4,800).

Gulf University for Science and Technology, Kuwait, “Collaboration in Development of Programs in the New GUST College of Engineering”; Co-Principal Investigator; August 2008 to July 2013; \$1,956,700; (W.P. Schonberg: \$97,835; other S&T Co-PIs: \$1,858,865).

U.S. Army Research Office, “HVIS2007: The 2007 Hypervelocity Impact Symposium”; Principal Investigator; November 2006 to December 2007; \$9,950.

U.S. Department of Transportation/UTC, “Adding Faculty in Transportation Areas”; Principal Investigator; June 2006 to July 2008; \$468,878 (DOT: \$300,000; UMR Cost-Share: \$168,878).

National Science Foundation, “International Research Experience for Students (IRES) in Emerging Construction Technologies”; Co-Principal Investigator; April 2006 to March 2009; \$126,672 (W.P. Schonberg: \$27,868; other UMR Co-Principal Investigators: \$98,804).

21<sup>st</sup> Century Systems, Inc., “AmmoSIM Rubble Characterization Model”; Principal Investigator; May 2005 to December 2005; \$55,046 (W.P. Schonberg: \$22,018; other UMR Co-Principal Investigators: \$33,028).

U.S. Army Research Office, “HVIS2005: The 2005 Hypervelocity Impact Symposium”; Principal Investigator; July 2005 to December 2005; \$9,750.

Department of Transportation/UTC, “Enhancing Student Awareness and Faculty Capabilities in Transportation Engineering”; Principal Investigator; July 2004 to June 2006; \$150,121 (W.P. Schonberg: \$15,012; other UMR Co-Principal Investigators: \$135,110).

State of Missouri Research Board, “Acquisition of an Integrated Testing System for Civil Infrastructure Engineering Research and Education”; Co-Principal Investigator; August 2001 to



July 2002; \$32,477 (W.P. Schonberg: \$3,248; other UMR Co-Principal Investigators: \$29,229).

National Science Foundation/Major Research Instrumentation Program, "Acquisition of an Integrated Testing System for Civil Infrastructure Engineering Research and Education"; Co-Principal Investigator; August 2001 to July 2002; \$483,321 (NSF: \$338,325; UMR Cost-Share: \$144,996; W.P. Schonberg: \$33,833/NSF + \$14,450/UMR).

Universal Technology Corporation/U.S. Air Force, "Structural Monitoring of Aircraft"; Co-Principal Investigator; August 2000 to December 2001; \$641,600 (W.P. Schonberg: \$64,160; other UMR Co-Principal Investigators: \$577,440).

Missouri Research Board, "Increasing the Safety of Manned Space Operations"; Principal Investigator; October 2000 to September, 2001; \$16,000.

U.S. Department of Transportation, "Operation of the UTCA Branch Office at the University of Alabama in Huntsville", Principal Investigator, January 1999 to August 1999; \$81,842 (USDOT: \$41,636; UAH: \$40,206 Cost Share).

Sandia National Laboratory, "HVIS98-SNL", Principal Investigator, July-Dec. 1998; \$10,250.

Army Research Office, "HVIS98", Principal Investigator, July 1998 to December 1998; \$5,000.

Alabama Space Grant Consortium, "1998 Hypervelocity Impact Symposium", Principal Investigator, July 1998 to December 1998; \$5,000.

NASA/Marshall Space Flight Center, "Characterization of Orbital Debris Impact Ejecta", Principal Investigator; August 1997 to August 1998; \$24,590.

NASA/Marshall Space Flight Center, "High Speed Impact Analysis II"; Principal Investigator; May 1996 to July 1997; \$16,313.

NASA/Graduate Student Researchers Program, "Space System Design Considerations of the Orbital Debris Environment: Year III"; Faculty Advisor; Sept 1994 to August 1995; \$22,000.

NASA/Marshall Space Flight Center, "High Speed Impact Analysis"; Principal Investigator; September 1994 to May 1995; \$53,961.

U.S. Army/Missile Command, "Projectile Impact Investigations in Analog Test Specimens: Phase II"; Principal Investigator; May 1993 to December 1993; \$25,000.

NASA/Marshall Space Flight Center, "Vulnerability of Space Station Freedom Modules: A Study of the Effect of a Module Perforation on Crew and Equipment"; Co-Principal Investigator; September 1993 to August 1994; \$253,464 (W.P. Schonberg: \$39,759; G.R. Hough: \$213,705).

NASA/Graduate Student Researchers Program, "Space System Design Considerations of the Orbital Debris Environment: Year II"; Faculty Advisor; Sept 1993 to August 1994; \$22,000.

Air Force Office of Scientific Research, "Characterizing the Solid Fragment Population in a Debris Cloud Created by a Hypervelocity Impact"; Principal Investigator; January 1993 to December 1993; \$25,074 (AFOSR: \$19,991; UAH: \$5,083 Cost-Share).

NASA/Graduate Student Researchers Program, "Space System Design Considerations of the Orbital Debris Environment, Year I"; Faculty Advisor; Sept 1992 to August 1993; \$22,000.

NASA/Graduate Student Researchers Program, "Hypervelocity Impact of Habitable Spacecraft Modules: Year III"; Faculty Advisor; June 1992 to May 1993; \$22,000.

U.S. Army/Missile Command, "Projectile Impact Investigations in Analog Test Specimens: Phase I"; Co-Principal Investigator; August 1991 to September 1991; \$25,000 (W.P. Schonberg: \$11,586; T.A. Neely: \$13,414).

NASA/Graduate Student Researchers Program, "Hypervelocity Impact of Habitable Spacecraft Modules: Year II"; Faculty Advisor; June 1991 to May 1992; \$22,000.

NASA/Graduate Student Researchers Program, "Hypervelocity Impact of Habitable Spacecraft Modules: Year I"; Faculty Advisor; June 1990 to May 1991; \$22,000.

NASA/Marshall Space Flight Center, "Nodes and Airlocks - Meteoroid/Debris Protection"; Principal Investigator; March 1990 to December 1992; \$116,977.

Engineering Foundation/American Society of Mechanical Engineers, "Predicting the Response of Space and Aerospace Structures to Hypervelocity Debris Particle Impact"; Principal Investigator; September 1989 to May 1991; \$20,000.

NASA/Marshall Space Flight Center, "Hypervelocity Impact Data Analysis for the Design of Space Station Meteoroid and Space Debris Protection Systems"; Principal Investigator; January 1989 to March 1990; \$76,988.

UAH/Research Institute, "Predicting the Impact Response of Composite Beams"; Principal Investigator; January 1989 to December 1989; \$2,485.

UAH/Research Institute, "Failure Analysis for Beams through the Study of Internal Stress Fields"; Principal Investigator; January 1988 to December 1988; \$1,492.

NASA/Marshall Space Flight Center, "Stress and Fatigue Study of Formed Metal Bellows"; Co-Principal Investigator; October 1987 to March 1989; \$186,561 (W.P. Schonberg: \$64,669; G.R. Guinn: \$121,892).

UAH /Research Institute, "Dynamic Impact of Beams - A Correlation of Experimental and Analytical Theories"; Principal Investigator; March 1987 to February 1988; \$1,237.

## **RESEARCH AWARDS AND FELLOWSHIPS**

Fulbright Distinguished Chair Award, U.S. State Department, 2018 (\$51,000).

NASA/ASEE Summer Faculty Fellowship Program, NASA/Jet Propulsion Laboratory, 2016 (\$17,550); 2014 (\$13,500); 2006 (\$12,000).

Friedrich Wilhelm Bessel Research Award, Humboldt Foundation, 2007 (€40,000).

NASA/ASEE Summer Faculty Fellowship Program, NASA/Marshall Space Flight Center, 1995 (\$11,000); 1994 (\$10,000).

Air Force Office of Scientific Research/Summer Faculty Research Program, Wright Laboratory, Eglin Air Force Base, 1993 (\$13,080); 1992 (\$12,760).

NASA/ASEE Summer Faculty Fellowship Program, NASA/Marshall Space Flight Center, 1988 (\$8,000); 1987 (\$8,000).

Walter P. Murphy Fellowship, Northwestern University, 1981; \$5000.

## **PANELS AND WORKSHOPS**

“A Conversation on Learning”, Black Man’s Think Tank, Missouri S&T, Rolla, Missouri, May, 2015.

“Gender and Tertiary Education”, University College of the Cayman Islands, March, 2012.

“Leadership in Education”, University College of the Cayman Islands, March, 2011.

“Effect of Technology on Higher Education”, Panel Member, Princeton University, June, 2006.

## **SEMINARS PRESENTED**

“FE Exam Review: Ethics, Professionalism, and Licensure”, Civil, Architectural, and Environmental Engineering Department, Missouri S&T, Rolla, Missouri, April 2018.

“Engineering Ethics and Professionalism”, Chemical Engineering Department Seminar Series, Missouri S&T, Rolla, Missouri, February 2018; February, 2017; February, 2016; January, 2015.

“The Ethics of Engineering Design and Risk”, Chi Epsilon Chapter Meeting, Missouri S&T, Rolla, Missouri, October, 2016.

“Studies of Hypervelocity Impact Phenomena as Applied to the Protection of Spacecraft Operating in the MMOD Environment”, The Aerospace Corporation, El Segundo, California, July, 2016.

“Heavens, What a Mess!”, Special Seminar, Physics Department, University of the West Indies, St. Augustine, Trinidad & Tobago, November, 2015.

“Engineering Ethics and Sustainable Design”, Special Seminar, College of Engineering, University of Missouri, Columbia, Missouri, April, 2015.

“Heavens, What a Mess! How to Deal with the Problem of Space Debris”, St. Louis Academy of Science, St. Louis, Missouri, October, 2014 (<https://www.youtube.com/watch?v=Liv3uD7Nh1E>, starting at 3:09).

“The Ethics of Risk in Engineering Design”, Stonehenge Brigade, Army ROTC, Missouri S&T, Rolla, Missouri, October, 2014.

“The Ethics of Sustainable Design”, Chi Epsilon Chapter Meeting, Missouri S&T, Rolla, Missouri, September, 2014.

“The Ethics of Engineering Design and Risk”, NASA/Jet Propulsion Laboratory, Pasadena, California, August, 2014.

“Heavens, What a Mess!”, Special Seminar, Department of Aeronautics and Astronautics, Stanford University, Palo Alto, California, July, 2014.

“Space Junk”, Cayman Society of Architects, Surveyor, and Engineers, Georgetown, Grand Cayman, April, 2014.

“MMOD Risk Assessment: Some Recent Developments and Some Suggestions for the Future”, NASA/Jet Propulsion Laboratory, Pasadena, California, December, 2012.

“Heavens, What a Mess!”, Special Seminar, Physics Department, University of Illinois at Urbana-Champaign, November, 2012; Rockwood School District, Partners in Education Program, May, 2012; MAE Department Graduate Seminar Series, Missouri S&T, September, 2011; Chi Epsilon Chapter Meeting, Missouri S&T, August, 2013, February, 2010; Linda Hall Library, Kansas City, Missouri, October, 2009.

“Space Debris – An Overview of Key Issues and Satellite Insurance Considerations”, Swiss Re, Kansas City, Missouri, October, 2009.

“Orbital Debris – aka Space Junk”, Missouri Society of Professional Engineers, 72<sup>nd</sup> Annual Convention, Branson, Missouri, June, 2009.

“Sustainable Lunar Habitat Protection against Damage by Meteoroid Impacts”, Sigma Gamma Tau Chapter Meeting, Missouri S&T, February, 2008.

“Assessing and Reducing the Vulnerability of Future Earth-Orbiting and Lunar Missions”, Fraunhofer Ernst Mach Institute, Freiburg, Germany, December, 2007.

“Protecting Lunar Habitats against Meteoroid Impact Damage”, European Space Agency, Science, Technology, and Engineering Center, Noordwijk, The Netherlands, November, 2007.

“Filling the Pipeline: Providing Engineering Graduates to Meet National Needs”, TL07: The 2007 Transmission Line Symposium, Kansas City, Missouri, April, 2007.

“Modeling Explosive Interactions with Structures Using Coupled Eulerian and Lagrangian Grids”, 7<sup>th</sup> World Congress on Computational Mechanics, Los Angeles, California, July, 2006.

“Heavens, What a Mess!”, Adler Planetarium, Chicago, Illinois, April, 2006.

“The Mysteries of Stonehenge”, University of Missouri-Rolla, Freshman Seminar, Rolla, Missouri, February, 2006.

“Faculty Licensure: Pros and Cons”, American Society of Civil Engineers Annual Meeting, Baltimore, Maryland, October, 2004.

“Heavens, What a Mess!”, American Institute of Aeronautics and Astronautics, Missouri Section Meeting, March 2004; Society of American Military Engineers, Mid-Missouri Chapter Meeting, February, 2004.

“Space Debris and Space Junk”, Sigma Xi, Rolla Chapter Meeting, February 2003; Missouri Society of Professional Engineers, Lake Ozark Section Meeting, September, 2002; UMR Mechanical and Aerospace Engineering Department Seminar Series, January, 2001.

“Dealing with the Problem of Space Debris”, Chi Epsilon Luncheon Meeting, ASEE Annual Convention, St. Louis, Missouri, June, 2000.

“Heavens, What a Mess!”, UMR Civil Engineering Department Seminar Series, September 1999; UAH ElderHostel Session, May, 1997; UAH Lifelong Learning Academy, Huntsville, Alabama, October, 1996.

“Space Station Crew Risk Assessment”, University of Alabama System Board of Trustees Meeting, Huntsville, Alabama, April, 1996.

“Cracking Characteristics of a Habitable Module Pressure Wall Following Orbital Debris Penetration”, NASA/Marshall Space Flight Center, Alabama, August, 1994.

“An Analysis of the Dynamic Response of the Space Station Freedom Due to a Module Perforation by an Orbital Debris Particle Impact”, Future Leaders in Science and Engineering Symposium, NASA/Marshall Space Flight Center, May, 1993.

“Use of Ballistic Ranges to Test Alternative Designs and Materials for Perforation Resistant Space Structures”, Co-author with Eve J. Walker, Symposium on Applications of Ballistic Ranges for Military and Aerospace Research, Huntsville, Alabama, October, 1990.

“The Status and Use of the UAH Aerophysics/Propulsion Facility”, Co- Speaker with Gerald R. Guinn and Roy A. Taylor, Mechanical Engineering Seminar Series, University of Alabama in Huntsville, March, 1990.

“Predicting Penetration and Ricochet Damage Due to an Oblique Hypervelocity Impact”, Second Post-SMiRT Impact Seminar, Anaheim, California, August, 1989.

“Hypervelocity Impact Testing of Dual-Wall Structures”, Fifth Annual Technical and Business Exhibition and Symposium, Huntsville, Alabama, May, 1989.

“Hypervelocity Impact Testing for Space Station Applications”, Department of Mechanical Engineering Seminar Series, University of Alabama in Huntsville, November, 1988.

“Further Investigation of Oblique Hypervelocity Impact Phenomena”, NASA/Marshall Space Flight Center, August, 1988.

“Hypervelocity Impact Studies for the Space Station”, American Society of Civil Engineers, Alabama Section, Annual Conference, Huntsville, Alabama, April, 1988.

### **PROFESSIONAL AFFILIATIONS**

American Institute of Aeronautics and Astronautics (*Associate Fellow*)

American Society of Civil Engineers (*Fellow*)

American Society of Mechanical Engineers (*Fellow*)

American Society of Engineering Education (Member)

Chi Epsilon (*Honor Member*, Missouri S&T)

Hypervelocity Impact Society (*Distinguished Scientist*)

### **DOCTORAL STUDENTS SUPERVISED**

- Asareh, Mohammad-Amin, Dynamic Behavior of Operational Wind Turbines Considering Aerodynamic and Seismic Load Interaction, May, 2015.
- Minggang Zhou, Further Studies of Non-Hertzian Contact and Low Velocity Impact Phenomena, December, 1999.
- Mohamed Tarek Sayyah, A New Failure Criterion for the Space Shuttle Main Engine High Pressure Turbopump, August, 1999.
- Ahmed Ebrahim, Analytical Modeling of the Oblique Hypervelocity Impact of Thin Plates, June 1998.
- Patrick Tobbe, Substructure Modal Selection for Multi-Body Dynamic Simulations, June 1995.
- Thomas Howsman, Dynamics of Geometrically Non-Linear Multi-Body Systems, June 1993.

### **MASTERS THESIS STUDENTS SUPERVISED**

- Madhukar Singh, Adhesively Bonded Patch Repair of Aircraft Fuselages with Simultaneous Cracking and Corrosion Damage, August, 2002.
- Paresh Kumar, Adhesively Bonded Patch Repair of Corroded Aircraft Fuselages under Fatigue Loads, August, 2002.
- Kuifeng Hu, Ballistic Limit Curves for Non-Spherical Projectiles Impacting Dual-Wall Structures, June, 2002.

- Dominik Depczuk, Modelling Oblique Hypervelocity Impact Phenomena, June, 2001.
- Gregory Kruse, Modelling Micro-Debris Created in a Hypervelocity Impact on a Complex Target, June, 1999.
- Hill, Ashley, A Structural Dynamic Analysis of the METEOR Rocket Post-Launch Failure, December, 1996.
- Toby Norris, A Finite Element Study of Linear and Non-Linear Effects for a Two-Dimensional Surface Contact Problem, June, 1995.
- Matthew Triplett, Static and Dynamic Finite Element Analysis of Honeycomb Sandwich Structures, June, 1995.
- Mohamed Tarek Sayyah, Effect of Setback Distance on Steel T-shaped Connection Response, December, 1994.
- Robert Vaughan, An Inelastic Analysis of a Welded Aluminum Joint, June, 1994.
- William Jolly, Analytical Prediction of Hole Size due to Hypervelocity Impact of Spherical Projectiles, December, 1993.
- Gregory Olsen, Crack Growth Initiation in a Habitable Spacecraft Module due to an On-Orbit Hypervelocity Impact, June, 1993.
- Eve Walker, Hypervelocity Impact of Habitable Spacecraft Modules, December, 1992.
- Minggang Zhou, Further Studies in the Analysis of Contact and Low Velocity Impact Phenomena, December, 1992.
- John Celestian, Dynamic Response of Space Station Freedom Caused by a Module Perforation from a Hypervelocity Impact, June, 1992.
- F-W Yang, Response of Space Structures to Orbital Debris Particle Impact, December, 1991.
- Jeff Peck, Asymmetric Indentation of a Finite Elastically Supported Beam, December, 1991.
- Edmond Limoge, Optimum Ringframe Size and Spacing to Inhibit Yielding in Short Cylindrical Sections, June, 1990.
- Philip Beasley, Stress Analysis of U-Shaped Formed Metal Bellows, December, 1990.

#### **EXTERNAL GRADUATE STUDENT COMMITTEE SERVICE**

- Brooke Myers, PhD Committee Member, University of Denver, 2008.
- Shannon Ryan, PhD Committee Member, Royal Melbourne Institute of Technology, 2007.
- Timothy Maclay, PhD Committee Member, University of Colorado-Boulder, 1996.

#### **NON-THESIS MASTERS STUDENTS SUPERVISED**

- William Hess, The Design of Reinforced Concrete Drilled Piers for Geological Conditions in North Alabama, June, 1996.

#### **JOURNAL EDITORIAL BOARD MEMBERSHIPS**

*International Journal of Impact Engineering* (Elsevier Publishers)

- Member, Editorial Advisory Board, 2011 – present.
- Guest Editor, Special Issues: Proceedings of the 2005 (*IJIE Vol. 35*), 2007 (*IJIE Vol. 35*), 2010 (*IJIE Vol. 38*), and 2012 (*IJIE Vol. 56*) Hypervelocity Impact Symposia.

## TECHNICAL CONFERENCE ACTIVITIES

### Conferences Organized

- *2015 Hypervelocity Impact Symposium*, Boulder, Colorado, 2015; Symposium Co-Chair.
- *2007 Hypervelocity Impact Symposium*, Williamsburg, Virginia, 2007; Technical Program Co-Chair.
- *2005 Hypervelocity Impact Symposium*, Squaw Valley, California, 2005; Technical Program Co-Chair and Symposium Treasurer.
- *1998 Hypervelocity Impact Symposium*, Huntsville, Alabama, 1998; Symposium Chair.

### Technical / Conference Program Committee Membership

- *Towards a Corruption-Free Caribbean: Ethics, Values, Trust, and Morality*, 2014 (Grand Cayman, BWI).
- *Hypervelocity Impact Symposium*, 1998 (Huntsville, AL), 2000 (Houston, TX), 2003 (Noordwijk, The Netherlands), 2005 (Squaw Valley, CA), 2007 (Williamsburg, VA), 2010 (Freiburg, Germany), 2012 (Baltimore, MD).
- *Computational Ballistics 2005*, Spain, 2005.
- *Structures under Shock and Impact VIII*, Greece, 2004.
- *20<sup>th</sup> International Ballistics Symposium*, Orlando, FL, 2002.
- *12<sup>th</sup> International Conf on Shock Compression of Condensed Matter*, Atlanta, GA, 2001.
- *SPIE Symposium on the Characteristics and Consequences of Orbital Debris and Natural Space Impactors*, Denver, CO, 1996.
- *AIAA Space Pgms and Technologies Conf and Exhibit*, Huntsville, AL, 1994 to 1996.
- *Young Faculty Research Symposium*, UAH, Huntsville, Alabama, 1996.

### Sessions Organized

- *Orbital Debris Impact Modeling and Impact Effects*, AIAA Space Programs and Technologies Conference and Exhibit, Huntsville, AL, 1996.
- *Lethality Code Validation for Civilian and Military Space Applications*, AIAA Space Programs and Technologies Conference and Exhibit, Huntsville, AL, 1994 and 1995.

## PROFESSIONAL/TECHNICAL COMMITTEES

### International

- Hypervelocity Impact Society Board of Directors; Member, 2003 to 2007, 2012 to present; President, 2000 to 2003, 2017 to present; Secretary/Treasurer, 1998 to 2000.
- Publications Committee, Hypervelocity Impact Society; Member, 2003 to 2005; Chair, 2005 to 2012.
- Educational Outreach Committee, Hypervelocity Impact Society; Member, 1994 to 1996.



## **National**

- Assessment of Spacecraft Passivation Techniques, NASA Engineering and Safety Center, October 2018 to present.
- Survivability Technical Committee, American Institute of Aeronautics and Astronautics (AIAA), July 2018 to present.
- MMOD Pressure Vessel Failure Criteria Independent Review and Assessment, NASA Engineering and Safety Center, September 2015 to present.
- JPSS MMOD Assessment, NASA Engineering and Safety Center, May 2014 to May 2015.
- Committee for the Assessment of the U.S. Air Force's Astrodynamics Standards, NAE / National Research Council; Member, September 2011 to June 2012.
- Committee on the Assessment of NASA's Orbital Debris Programs, NAE/National Research Council; Member, November 2010 to June 2011.
- Lightweight Installable MMOD Shield Concepts for ISS Modules, NASA Engineering and Safety Center, January 2010 to February 2011.
- Independent Review of US and Russian PRAs for MRM-2 MMOD Risk Calculations, NASA Engineering and Safety Center, November 2009 to December 2009.
- Independent Review of Constellation (Cx) MMOD Risk Analysis Committee, NASA Engineering and Safety Center, August 2008 to April 2009.
- Standards Development Committee for Structures, Structural Components, and Structural Assemblies, AIAA/U.S.A.F. Space and Missile Systems Center, August 2004 to July 2005.
- Independent Meteoroid/Orbital Debris Risk Assessment Tool Validation and Verification Committee, NASA Engineering and Safety Center, August 2004 to June 2005.
- Committee on Space Shuttle Meteoroid/Orbital Debris Risk Management, NAE/National Research Council; Member, April 1997 to October, 1997.
- Weapons System Effectiveness Technical Committee, American Institute of Aeronautics and Astronautics; Charter member, 1995 to 1998.
- NASA/Boeing Space Station Freedom Meteoroid/Debris Working Group; 1988 to 1993.

## **Regional**

- Associate Fellows Nominations Review Committee, AIAA / St. Louis Section, 2007 to present.
- Missouri Transportation Institute; Board of Directors, 2006 to 2007.
- Missouri Department of Transportation Peer Review Program; Committee Member, 2001.
- Missouri Transportation Research and Education Council; Executive Committee Member; 1999 to 2004.
- State of Alabama University Transportation Center; Board of Directors, 1998 to 1999.
- American Society of Civil Engineers, Huntsville Branch, Treasurer and Member of the Board of Directors, 1990 to 1992.
- Impact Mechanics Working Group, Aerophysics Research Center; Chair; 1990 to 1991.

## MAJOR UNIVERSITY COMMITTEES

### Missouri University of Science and Technology (formerly University of Missouri – Rolla) (1999-present)

- Coordinated Community Response Team, OVW Campus Program Grant; Member; 2016 to present.
- Study Abroad Committee; Member, 2009 to present.
- Ad Hoc Committee on Distance and Remote Programs, College of Engineering, Co-Chair; May 2018 to October 2018.
- Faculty Workload Task Force; Member; CArE Engineering Department; 2017 to 2018.
- Campus Tenure Policy Committee; Member; 2017 to 2018.
- Campus Promotion and Tenure Committee; Department Representative; 2016 to 2018.
- College of Engineering, Discipline Specific Promotion and Tenure Committee; Member; 2016 to 2018.
- Faculty Senate Discipline Specific Curriculum Committee; Member; 2016 to 2018.
- Graduate Student Assignment and Workload Task Force; Member; CArE Engineering Department; 2016 to 2018.
- Title IX Curricular Development and Implementation Committee; Co-Vice Chair; 2014 to 2016.
- Career Opportunities Center Advisory Board; Member, 1999 to 2015.
- Committee of Department Chairs; Member, 1999-2015; Chair, 2001 to 2002.
- Campus Strategic Planning Committee; Member, 2012 to 2013.
- President's Awards for University Citizenship Advisory Committee; Member, 2012.
- Campus eLearning Committee; Member, 2009 to 2011.
- HLC Institutional Assessment Committee; Member, 2008 to 2011.
- *ad hoc* Committee on (Re)defining the Role of the Department Chair at Missouri S&T; Member, 2009 to 2010.
- Graduate Student Stipend Task Force; Chair, 2008 to 2009.
- Jones Chaired Professorship Search Committee; CArE Engineering Department; Chair, 2007 to 2010.
- *ad hoc* Committee on Biomedical Engineering; Member, 2006 to 2007.
- Administrative Reorganization of External Affairs Activities Committee; Member, 2006 to 2007.
- Vice Provost for Research Search Committee; Member, 2006.
- Resource Allocation Model Committee; Member, 2004 to 2005.
- Missouri Transportation Institute Executive Director Search Committee; Member, 2004.
- Missouri Transportation Institute Steering Committee; Member, 2003 to 2004.
- Blue Ribbon Task Force on Faculty Workload; Member, 2002 to 2003.

### University of Alabama-Huntsville (1986-1999)

- Faculty Research Awards Committee (Chair)
- Faculty Integrity Committee

- Faculty Senate; Member (6 years), Secretary (4 years)
  - Admissions & Scholastic Affairs Committee
  - Curriculum Committee
- Library Appropriations Committee (Chair)
- School of Engineering Dean Search Committee
- Strategic Planning Committee
- Student Outcomes Assessment Task Force
- Student Recruitment and Retention Committee (Chair)
- Faculty Panel, New Student Orientation

### **PEER REVIEW ACTIVITIES**

*Journals:* AIAA Journal, Composites Engineering, International Journal of Impact Engineering, International Journal of Solids and Structures, Journal of Aerospace Engineering, Journal of Aircraft, Journal of Applied Mechanics, Journal of Engineering Mechanics, Journal of Sound and Vibration, Journal of Spacecraft and Rockets, Proceedings of the IMechE, Part G (Aerospace Engineering), Space Debris.

*Funding Agencies:* European Research Council, Connecticut Innovations Incorporated, International Science Foundation (Canada), NDSEG Fellowship Program (ASEE).

*Other:* American Council of Engineering Companies of Missouri; Defense Intelligence Agency.

### **PROFESSIONAL REGISTRATION**

- Professional Engineer, State of Missouri, Reg. No. 2000158254
- Professional Engineer, State of Alabama, Reg. No. 20720

### **PROFESSIONAL DEVELOPMENT**

- 2018 Orbital Debris Workshop, Center for Orbital Debris Education and Research, University of Maryland, November, 2018.
- 2014 Orbital Debris Workshop, Center for Orbital Debris Education and Research, University of Maryland, November, 2014.
- New AISC Construction Management Teaching Aids, AISC, Chicago, Illinois, April, 2006.
- ExCEEEd Two-Day Mini-Workshop, Missouri S&T, Rolla, Missouri, October, 2004 (host and sponsor).
- Teaching and Scholarship in the Grand Tradition of Modern Engineering II, Princeton University, August, 2004.
- ExCEEEd Teaching and Learning Seminar, ASCE, Nashville, Tennessee, November, 2003.
- ABET Evaluator Training Workshop, ASCE, Nashville, Tennessee, November, 2003.
- Teaching and Scholarship in the Grand Tradition of Modern Engineering I, Princeton University, May, 2003.
- Blackboard Workshop, UMR, Rolla, Missouri, August, 2002.
- Research Management Peer Exchange, Missouri DOT, Jefferson City, Missouri, April, 2002.
- New Developments in Teaching Structural Steel Design, AISC Workshop, AISC, New York

- City, October, 1999
- ABET EC2000 Faculty Workshop, ABET, Atlanta, Georgia, December, 1998
  - Scale Modeling in Engineering Dynamics, Southwest Research Institute, San Antonio, Texas, June, 1991.
  - ACI/PCA 318-89 Building Code Seminar: Recent Changes in the Concrete Building Code Requirements, ACI, Birmingham, Alabama, October, 1990
  - The Growing Challenge: A Short Course on Dealing With Orbital Debris, Southwest Research Institute, San Antonio, Texas, March, 1990.

## **TEACHING ACTIVITIES**

*Undergraduate Courses:* Engineering Law and Ethics (*at UCCI*), Statics, Dynamics, Structural Analysis I and II, Soil Mechanics, Structural Steel Design, Civil Engineering Senior Design Project, Engineering Communication and Computation, Senior Seminar – Contemporary Issues and the Global Impact of Engineering Solutions.

*Graduate Courses:* Applied Mechanics in Structural Engineering, Finite Element Methods, Theory of Vibrations, Applied Mechanics of Solids, Theory of Structural Stability, Hypervelocity Impact Phenomena, Advanced Penetration Mechanics, Composite Materials, Finite Element Methods, Theory of Plates and Shells, Fracture Mechanics, Elasticity, Plasticity, Engineering Analysis I, Advanced Structural Analysis.

*Short Courses:* Penetration Phenomena in Low and High Speed Impact, University of Alabama in Huntsville Continuing Education Division, February, 1989.

## **RECENT MEDIA CITATIONS**

“A city in China wants to launch an artificial moon into space”, <https://www.nbcnews.com/mach/science/city-china-wants-launch-artificial-moon-space-nca923946>, October 25, 2018. Also appeared <https://www.msn.com/en-us/news/world/a-city-in-china-wants-to-launch-an-artificial-moon-into-space/arBBORUeM> (October 25, 2018), <https://vaaju.com/a-city-in-china-wants-to-start-an-artificial-moon-in-space/> (October 25, 2018), and <http://www.tab.eti.mk/News/Preview/97922/a-city-in-china-wants-to-launch-an-artificial-moon-into-space> (October 25, 2018).

“China space station headed toward Earth -- will it hit NYC?”, <http://ekekeee.com/2018/03/30/china-space-station-headed-toward-earth-will-it-hit-nyc.html>, March 30, 2018.

“Missouri S&T Space Debris Expert Available to Discuss Tiangong-1 Space Station”, <http://www.newswise.com/articles/missouri-st-space-debris-expert-available-to-discuss-tiangong-1-space-station>, March 28, 2018.

“Civil engineer named as Fulbright scholar”, <https://www.engineersaustralia.org.au/News/civil-engineer-named-fulbright-scholar>, March 27, 2018. Also appeared at <https://www.engineersaustralia.org.au/portal/news/civil-engineer-named-fulbright-scholar> (March 27, 2018), and <http://www.bricengineering.com.au/> (March 27, 2018).

“On-demand meteor showers may be on the way”, <https://www.nbcnews.com/mach/science/demand-meteor-showers-may-be-way-ncna860466>, March 27, 2018. Also appeared at <https://infoglitz.com/on-demand-meteor-showers-may-be-on-their-way/> (March 27, 2018), and <http://www.kvoa.com/story/37823454/on-demand-meteor-showers-may-be-on-the-way> (March 27, 2018).

On-Air Interview, KCBS Newsradio 740 (San Francisco), April 26, 2017.

On-Air Interview, KNX-LA/CBS Newsradio 1070, *In-Depth News with Charles Feldman and Chris Seden*, July 28, 2016.

“Take The Long Way Home: Spacefarers' Journey Prolonged By Space Junk”, <http://www.npr.org/2015/09/04/437597059/take-the-long-way-home-spacefarers-journey-prolonged-by-space-junk>, *All Things Considered News Segment*, September 4, 2015.

“The Problem of Junk Hurling Through Space: A Missouri Man Is On It”, <http://kcur.org/post/problem-junk-hurling-through-space-missouri-man-it>, February 10, 2015.

“There are 300,000 Pieces of Garbage Orbiting earth, and it's a Big Problem”, <http://www.vox.com/2015/1/20/7558681/space-junk>, January 20, 2015.

“NASA honors Schonberg for space debris work”, [http://www.coder.umd.edu/news/news\\_story.php?id=8772](http://www.coder.umd.edu/news/news_story.php?id=8772), January 19, 2015.

“Space Debris Expert Warns About Dangers of Orbital Junk”, <http://www.spaceflightinsider.com/missions/human-spaceflight/space-debris-expert-warns-dangers-orbital-junk/>, January 14, 2015. Also appeared <http://www.astrowatch.net/2015/01/space-debris-expert-warns-about-dangers.html> (January 9, 2015), [http://www.SpaceDaily.com/reports/Space Debris Expert Warns About Dangers of Orbital Junk 999.html](http://www.SpaceDaily.com/reports/Space%20Debris%20Expert%20Warns%20About%20Dangers%20of%20Orbital%20Junk%20999.html) (January 11, 2015), <http://phys.org/news/2015-01-space-debris-expert-dangers-orbital.html> (January 12, 2015), and <http://www.science20.com/astrowatch/blog/space-debris-expert-warns-about-dangers-of-orbital-junk-152195> (January 12, 2015).

“Waste in Space is a Puzzle With Millions of Pieces”, <http://kbia.org/post/waste-space-puzzle-millions-pieces>, October 16, 2014.

“Waste in Space is a Puzzle With Millions of Pieces”, <http://news.stlpublicradio.org/post/waste-space-puzzle-millions-pieces>, October 14, 2014.

“Insights from Mud Volcanoes and Pitch Lake of Trinidad: Understanding the Mystery of Life”, <http://www.trinidadexpress.com/featured-news/Insights-from-mud-volcanoes-and-Pitch-Lake-of-Trinidad-268378792.html>, July 23, 2014.

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