

Mr. Wei Zhang, Ph.D.

Professor, Dept. Materials Science and Engineering, The Ohio State University

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Fellow, American Welding Society

EDUCATION

- Ph.D., Materials Science and Engineering, Pennsylvania State University, 2004
- M.S., Materials Science and Engineering, Huazhong University of Science and Technology, 2000
- B.S., Materials Science and Engineering, Huazhong University of Science and Technology, 1997

PROFESSIONAL EXPERIENCE

- 2018-present, Professor, Dept. Materials Science and Engineering, **The Ohio State University (OSU)**
 - 2013-2018, Associate Professor, Dept. Materials Science and Engineering, **OSU**
 - 2014-present, Steering Board, Simulation Innovation and Modeling Center (SIMCenter), **OSU**
- 2008-2012, Senior R&D Staff, **Oak Ridge National Laboratory**, Oak Ridge, TN
- 2004-2008, Engineering Team Leader, **Edison Welding Institute**, Columbus, OH
- 2000-2004, Research Assistant, **Pennsylvania State University**, University Park, PA

SUMMARY OF RESEARCH AND TEACHING CONTRIBUTIONS AND PRODUCTIVITY

- Contributed on a significant and sustained basis to advancing the new knowledge of welding and additive manufacturing such as bonding mechanisms, transport phenomena, weldability and process-microstructure-property relations:
 - Established several new research areas in Welding Engineering Program at OSU including (1) Additive Manufacturing, and (2) Joining of Light-Weight and Dissimilar Materials with significant external funding (e.g., NASA, ONR, DOE and Honda).
 - In addition, developed a broad and strong portfolio of research programs funded by a variety of sponsors ranging from federal agencies/labs (e.g., NSF I/UCRC, AFRL, ORNL, NREL etc.) to industry companies (e.g., GE Aviation, GE Additive, Ford, EWI, AREVA, AO Smith etc.).
- Published scholarship in high-impact journals and prominent conferences in the field of materials and manufacturing:
 - Licensed 1 software invention to a local Ohio small business, granted with 2 US patents, and filed 4 US patent applications.
 - One Ph.D. student paper received the 2017 Henry Granjon Prize for the best paper from International Institute of Welding (IIW).
- Established undergraduate and graduate courses with a focus on teaching the critical thinking skills to best insert modeling and simulation tools in solving scientific and engineering problems:
 - Developed a new technical elective class, Computational Modeling of Additive Manufacturing and Welding (WE4115/WE7115), which is also offered online for distance education.
 - Finalizing a new online certificate course, Finite Element Principles in Heat Conduction, to be offered through COE's Professional & Distance Education Programs in August 2020 (<https://professionals.engineering.osu.edu/Heat-Conduction>).

- Received 2016 Adams Memorial Membership Award from American Welding Society (AWS) in recognition of teaching activities that have advanced the knowledge of welding.
- P-status in both WE and MSE, and M-status in MGEL.

Awards

- **2018 Fellow, American Welding Society**, in recognition of significant contribution to the knowledge, science, and application of welding.
- **2018 Lumley Research Award** from College of Engineering, The Ohio State University in recognition of outstanding research activities.
- **2017 Henry Granjon Prize** from International Institute of Welding, coauthor for a best paper in Category B: Materials Behaviour and Weldability.
- **2016 Adams Memorial Membership Award** from American Welding Society (AWS) in recognition of teaching activities that have advanced the knowledge of welding at the undergraduate and graduate levels.
- **2010 UT-Battelle Significant Event Award** from Oak Ridge National Laboratory (ORNL) for significant research accomplishment by a research team.
- **2010 Koichi Masubuchi Award** from AWS for significant contributions to the advancement of science and technology of materials joining through research and development.
- **2006 Henry Granjon Prize** from International Institute of Welding for a best paper in the category of Joining and Fabrication Technology.
- **2005 William Spraragen Memorial Award** from American Welding Society, coauthor for a best paper published in Welding Journal.
- **2003 Kenneth Easterling Award** from International Institute of Welding, coauthor for a best paper presented at International Seminar Numerical Analysis of Weldability.
- **2003 Kennametal Fellowship Award** for Outstanding Graduate Research.
- **2001-2004 Graduate Fellowship Award** from American Welding Society.

Awards received by Students Advised

- Luke Walker (Undergraduate research assistant advised), EWI Award, OSU Department of Materials Science and Engineering, 2019.
- Luke Walker (Undergraduate research assistant advised), Donald and Shirley Hastings Scholarship, AWS, 2019.
- Tyler Borchers (Ph.D.): Henry Granjon Prize from International Institute of Welding (IIW) for best paper titled "*Exacerbated Stress Corrosion Cracking in Arc Welds of High-Strength Aluminum Alloys*" in the category of Materials Behaviour and Weldability, 2017.
- Ying Lu (Ph.D.): A picture from the paper first-authored by her was selected as a part of the front page for Journal of Materials Processing Technology (impact factor = 3.147).
- Brett Worrell (Undergraduate research assistant advised): 1st place in Denman Undergraduate Research Forum - Engineering, for poster titled "*Effect of Shielding Gasses and Heat Input on Corrosion Susceptible Precipitates*," 2017.
- Andrea Peer (Undergraduate research assistant advised): 2nd prize in AWS Annual Professional Program Poster Competition for poster titled "*Fundamental Understanding of Peculiar Magnesium Segregation during Welding of Advanced High-Strength Aluminum*," 2015.

- Jansen Lenzo and Michael Orr (Senior capstone group advised): 1st prize in AWS Annual Professional Program Poster Competition for poster titled “*Distortion Modeling of Wheel Loader Articulation Joint*,” 2015.

1. RESEARCH

Research Vision and Focuses: Advancing the new knowledge of welding and additive manufacturing such as bonding mechanisms, transport phenomena, weldability and process-microstructure-performance relations through innovative modeling and experimental methods.

- Integrated Computational Materials Engineering (ICME) of welding and additive manufacturing:
 - Multi-physics: coupled simulation of thermal, fluid flow, electrical, mechanical and metallurgical
 - Multi-scale: meso-scale discrete element method to engineering-scale finite element method
 - High-temperature constitutive models for thermal-stress and melt fluid flow simulations
 - Weld performance based on damage initiation, evolution and fracture mechanics
- *In-situ* high-resolution experimental measurements during welding and additive manufacturing:
 - Strain mapping using digital image correlation (DIC)
 - Residual stress measurement using neutron and synchrotron X-ray diffraction
- Testing of joint mechanical properties including creep, fracture toughness, and fatigue in welds and joints with highly-inhomogeneous microstructure.

Patents and Inventions

1. Patents Granted:

- J.-A. Wang, Z. Feng and **W. Zhang**, “Hydrogen Storage Container,” *Patent US 9,562,646 B2*, Feb. 7, 2017.
- S. S. Babu, C. Conrardy, S. P. Khurana, **W. Zhang** and W. Gan: “Remote High-Performance Computing Material Joining and Material Forming Modeling System and Method,” *Patent US 8,301,286 B2*, Oct. 30, 2012.

2. Software Inventions Licensed:

- Y. Lee and **W. Zhang**, “Powder Packing for Additive Manufacturing Modeling,” OSU Software Invention Disclosure T2016-084, Oct. 2015. **Software licensed commercially to Applied Optimization Inc. through OSU’s Technology Commercialization Office in Apr. 2016.**

3. Patents and Provisional Patents Filed:

- T. Borchers and W. Zhang, “Welding Methods and Welded Joints for Joining High-Strength Aluminum Alloys,” Patent Application No.: 15/341,179, November 2, 2016.
- D. Tung, W. Zhang, D. Mahaffey, S. L. Semiatin and O. Senkov, “Systems and Methods for Determining Efficiency of Friction Welding Processes,” U.S. Patent Application No. 15/824,251, November 28, 2017.
- W. Zhang, Y. Lu, E. Mayton and M. Kimchi, “Welding methods including formation of an intermediate joint using a solid state welding process”, U.S. Patent Application No. 16/006,903, Jun. 13, 2018.
- W. Zhang, Y. Lu, L. Walker and M. Kimchi, “Welding methods for joining light metal and high-strength steel using solid state and resistance spot welding processes,” U.S. Patent Application No. 16/508,669, July 11, 2019.

Publications in Peer-Reviewed Journals

bolded are advisees

1. Y. M. Zhang, Y. P. Yang, W. Zhang, S. J. Na, Advanced Welding Manufacturing – A Brief Analysis and Review of Challenges and Solutions, Journal of Manufacturing Science and Engineering, accepted for publication (June 2020).
2. H.L. Wei, T. Mukherjee, W. Zhang, J.S. Zuback, G.L. Knapp, A. De, T. DebRoy, Mechanistic models for additive manufacturing of metallic components, Progress in Materials Science, p. 100703 (2020). <https://doi.org/10.1016/j.pmatsci.2020.100703>
3. **X. Gao**, G. Abreu Faria, W. Zhang, K. R. Wheeler, Numerical analysis of non-spherical particle effect on molten pool dynamics in laser-powder bed fusion additive manufacturing, Computational Materials Science, Vol. 179, p. 109648 (2020). <https://doi.org/10.1016/j.commatsci.2020.109648>
4. **Y. Lu**, D. D. Sage, C. Fink, W. Zhang, Dissimilar metal joining of aluminium to zinc-coated steel by ultrasonic plus resistance spot welding – microstructure and mechanical properties, Science and Technology of Welding and Joining, Vol. 25, pp. 218-227 (2020). <https://doi.org/10.1080/13621718.2019.1667051> (Online 2019)
5. **Y. Lu, L. Walker**, M. Kimchi, Wei Zhang, Microstructure and Strength of Ultrasonic Plus Resistance Spot Welded Aluminum Alloy to Coated Press Hardened Boron Steel, Metallurgical and Materials Transactions A, Vol. 51, pp. 93-98 (2020). <https://doi.org/10.1007/s11661-019-05524-2> (Online 2019)
6. **Y. Lu, A. Peer**, T. Abke, M. Kimchi, W. Zhang, HAZ softening of resistance spot welded 3T dissimilar steel stack-up, Welding Journal, Vol. 98, pp. 328-s-336-s (2019). <https://doi.org/10.29391/2019.98.027>
7. T. DebRoy, T. Mukherjee, J. Milewski, J. W. Elmer, B. Ribic, J. J. Blecher, W. Zhang, Scientific, technological and economic issues in metal printing and their solutions, Nature Materials, Vol. 18, pp. 1026–1032 (2019). <https://doi.org/10.1038/s41563-019-0408-2>
8. **Y. Lu, K. Zhang**, J. Tran, E. Mayton, M. Kimchi, and W. Zhang, Optimizing ultrasonic plus resistance spot welding for dissimilar metal joining, Welding Journal, Vol. 98, pp. 273s-282s (2019). <https://doi.org/10.29391/2019.98.024>
9. T. Matsunaga, H Hongo, M. Tabuchi, M. Souissi, R. Sahara, **H. C. Whitt**, W. Zhang, M. J. Mills, Creep lifetime and microstructure evolution in boron-added 9Cr-1Mo heat-resistant steel, Materials Science and Engineering: A, Vol. 760, pp. 267-276 (2019). <https://doi.org/10.1016/j.msea.2019.05.114>.
10. G.A. Faria, K. Kadirvel, A. Hinojos, W. Zhang, Y. Wang, A.J. Ramirez, On the use of metastable interface equilibrium assumptions on prediction of solidification micro-segregation in laser powder bed fusion, Science and Technology of Welding and Joining, Online April 2019. <https://doi.org/10.1080/13621718.2019.1608406>
11. **H. Song**, T. McGaughy, A. Sadek, W. Zhang, Effect of structural support on microstructure of nickel base superalloy fabricated by laser-powder bed fusion additive manufacturing, Additive Manufacturing, Vol. 26, pp. 30-40 (2019). <https://doi.org/10.1016/j.addma.2018.12.017>
12. **Y. Lu**, E. Mayton, **H. Song**, M. Kimchi, W. Zhang, Dissimilar metal joining of aluminum to steel by ultrasonic plus resistance spot welding - Microstructure and mechanical properties, Materials & Design, Vol. 165, p. 107585 (2019). <https://doi.org/10.1016/j.matdes.2019.107585>
13. **D. Sorensen**, J.C. Myers, B. Li, W. Zhang, E. Hintsala, D. Stauffer, A.J. Ramirez, Optimization of A Dissimilar Platinum to Niobium Micro-Resistance Weld: A Structure-Processing-Property Study, Journal of Materials Science, Volume 54, Issue 4, pp 3421–3437 (2019). <https://doi.org/10.1007/s10853-018-3018-5>
14. **D. J. Tung**, D. W. Mahaffey, O. N. Senkov, S. L. Semiatin, and W. Zhang, Transient behaviour of torque and process efficiency during inertia friction welding, Science and Technology of Welding and Joining, Vol. 24, pp. 136-147 (2019). <https://doi.org/10.1080/13621718.2018.1491377>
15. Y.P. Yang, T.D. Huang, H.J. Rucker, C.R. Fisher, W. Zhang, M. Harbison, S.T. Scholler, **J.K. Semple**, and R. Dull, Weld Residual Stress Measurement Using Portable XRD Equipment in a Shipyard Environment Journal of Ship Production and Design, online: July 10, 2018 (2019). <https://doi.org/10.5957/JSPD.170056>
16. **Y. Lu, A. Peer**, T. Abke, M. Kimchi, and W. Zhang, Subcritical heat affected zone softening in hot-stamped boron steel during resistance spot welding, Materials & Design, Vol. 155, pp. 170-184 (2018).

<https://doi.org/10.1016/j.matdes.2018.05.067>

17. **T.E. Borchers**, A. Seid, P. Shafer, and W. Zhang, Exacerbated Stress Corrosion Cracking in Arc Welds of High-Strength Aluminum Alloys, *Welding in the World*, Vol. 62, pp. 783-792 (2018). *Henry Granjon prize 2017 winner Category B: Materials Behaviour and Weldability*. <https://doi.org/10.1007/s40194-018-0564-z>
18. **Y.S. Lee**, P. Nandwana, and W. Zhang, Dynamic simulation of powder packing structure for powder bed additive manufacturing, *The International Journal of Advanced Manufacturing Technology*, Vol. 96, pp. 1507-1520 (2018). <https://doi.org/10.1007/s00170-018-1697-3>
19. S. Wu, H. Gao, W. Zhang and Y. Zhang, "Recursive Analytic Weld Pool Model Calibrated by Measurements," *Welding Journal*, Vol. 97, pp. 108s-119s (2018). <https://doi.org/10.29391/2018.97.010>
20. T. Mukherjee, J. S. Zuback, W. Zhang and T. DebRoy, "Residual stresses and distortion in additively manufactured compositionally graded transition joints," *Computational Materials Science*, Vol. 143, pp. 325-337 (2018). <https://doi.org/10.1016/j.commatsci.2017.11.026>
21. T. DebRoy, H. L. Wei, J. S. Zuback, T. Mukherjee, J. W. Elmer, J. O. Milewski, A. M. Beese, A. Wilson-Heid, A. De, and W. Zhang, "Additive manufacturing of metallic components – process, structure and properties," *Progress in Materials Science*, Vol. 92, pp. 112-224 (2018). <https://doi.org/10.1016/j.pmatsci.2017.10.001>
22. S. Wu, H. Gao, W. Zhang, and Y. Zhang, "Analytic Weld Pool Model Calibrated by Measurements: Part 2 Verification and Robustness," *Welding Journal*, Vol. 96, pp. 250s-257s (2017).
23. **T.E. Borchers**, **A.J. Peer**, and W. Zhang, "Solute Enrichment in Fused-Overlap Zone of High Strength Aluminum Welds," *Welding Journal*, Vol. 96, pp. 229s-240s (2017).
24. O. Senkov, D. Mahaffey, **D. Tung**, W. Zhang, and S. Semiatin, "Efficiency of the Inertia Friction Welding Process and its Dependence on Process Parameters," *Metallurgical and Materials Transactions A*, Vol. 48A, pp. 3328-3342 (2017). <https://doi.org/10.1007/s11661-017-4115-9>
25. S. Wu, H. Gao, W. Zhang, and Y. Zhang, "Analytic Weld Pool Model Calibrated by Measurements: Part 1 Principles," *Welding Journal*, Vol. 96, pp. 193s-202s (2017).
26. S.L. Semiatin, D.W. Mahaffey, **D.J. Tung**, W. Zhang, and O.N. Senkov, "A Comparison of the Plastic-Flow Response of a Powder-Metallurgy Nickel-Base Superalloy under Nominally-Isothermal and Transient-Heating Hot-Working Conditions," *Metallurgical and Materials Transactions A*, Vol. 48A, pp. 1864-1879 (2017). <https://doi.org/10.1007/s11661-016-3907-7>
27. T. DebRoy, W. Zhang, J. Tuner and S. S. Babu, "Building digital twins of 3D printing machines," *Scripta Materialia*, Vol. 135, pp. 119-124 (2017). <https://doi.org/10.1016/j.scriptamat.2016.12.005>
28. T. Mukherjee, W. Zhang and T. DebRoy, "An improved prediction of residual stresses and distortion in additive manufacturing," *Computational Materials Science*, Vol. 126, pp. 360-372 (2017). <https://doi.org/10.1016/j.commatsci.2016.10.003>
29. **Y.S. Lee** and W. Zhang, "Modeling of heat transfer, fluid flow and solidification microstructure of nickel-base superalloy fabricated by laser powder bed fusion," *Additive Manufacturing*, Vol. 12, pp. 178-188 (2016). <https://doi.org/10.1016/j.addma.2016.05.003>
30. **Y. Lu**, **H. Song**, G. A. Taber, D. R. Foster, G. S. Daehn and W. Zhang, "In-Situ Measurement of Relative Motion during Ultrasonic Spot Welding of Aluminum Alloy using Photonic Doppler Velocimetry," *Journal of Materials Processing Technology*, Vol. 231, pp. 431-440 (2016). <https://doi.org/10.1016/j.jmatprotec.2016.01.006>
31. **A.W. Prabhu**, T. Vincent, A. Chaudhary, W. Zhang and S. S. Babu, "Effect of microstructure and defects on fatigue behaviour of directed energy deposited Ti-6Al-4V," *Science and Technology of Welding and Joining*, Vol. 20, p. 659 (2015). <https://doi.org/10.1179/1362171815Y.0000000050>
32. **T.E. Borchers**, A. Seid, S. S. Babu, P. Shafer and W. Zhang: "Effect of filler metal and post-weld friction stir processing on stress corrosion cracking susceptibility of Al-Zn-Mg arc welds," *Science and Technology of Welding and Joining*, Vol. 20, p. 460 (2015). <https://doi.org/10.1179/1362171814Y.0000000273>
33. **T.E. Borchers**, D. P. McAllister and W. Zhang: "Macroscopic Segregation and Stress Corrosion Cracking in 7xxx Series Aluminum Alloy Arc Welds," *Metallurgical and Materials Transactions A*, Vol. 46A, p. 1827 (2015).

<https://doi.org/10.1007/s11661-015-2796-5>

34. J. Chen, W. Zhang, Z. Feng, and W. Cai: "Determination of thermal contact conductance between thin metal sheets of battery tabs," *International Journal of Heat and Mass Transfer*, Vol. 69, p. 473 (2014).
35. Y. C. Lim, S. Sanderson, M. Mahoney, X. Yu, D. Qiao, Y. Wang, W. Zhang, and Z. Feng: "Characterization of Multilayered Multipass Friction Stir Weld on ASTM A572 G50 Steel," *Welding Journal*, Vol. 93, p. 443-s (2014).
36. D. Qiao, W. Zhang, T.-Y. Pan, P. Crooker, S. David, and Z. Feng: "Evaluation of residual plastic strain distribution in dissimilar metal weld by hardness mapping," *Science and Technology of Welding and Joining*, Vol. 18, pp. 624-630 (2013). <https://doi.org/10.1179/1362171813Y.0000000144>
37. E. K. Ohriner, W. Zhang, and G. B. Ulrich: "Analysis of Abrasive Blasting of DOP-26 Iridium Alloy," *International Journal of Refractory Metals and Hard Materials*, Vol. 35, p. 122 (2012). <https://doi.org/10.1016/j.ijrmhm.2012.05.002>
38. X.-L. Wang, K. An, L. Cai, ..., W. Zhang *et al.*: "Visualizing the chemistry and structure dynamics in lithium-ion batteries by in-situ neutron diffraction," *Scientific Reports*, Vol. 2, p. 747 (2012). <https://doi.org/10.1038/srep00747>
39. Z. Yu, W. Zhang, H. Choo and Z. Feng: "Transient Heat and Material Flow Modeling of Friction Stir Processing of Magnesium Alloy using Threaded Tool," *Metallurgical and Materials Transactions A*, Vol. 43, p. 724 (2012). <https://doi.org/10.1007/s11661-011-0862-1>
40. W. Zhang, Z. Feng, and P. Crooker: "Improved Procedure for Computing Residual Stresses from Neutron Diffraction Data and its Application to Multipass Dissimilar Welds," *Science and Technology of Welding and Joining*, Vol. 16, pp. 254-260 (2011). <https://doi.org/10.1179/1362171810Y.0000000023>
41. W. Zhang, Y. Du, Z. Feng, and J. Xu: "Transport modeling of membrane extraction of chlorinated hydrocarbon from water for ion mobility spectrometry", *International Journal for Ion Mobility Spectrometry*, Vol. 13, p. 65 (2010).
42. Y. Du, W. Zhang, W. Whitten *et al.*: "Membrane-extraction ion mobility spectrometry for in situ detection of chlorinated hydrocarbons in water", *Analytical Chemistry*, Vol. 82, p. 4089 (2010).
43. W. Zhang and Y. Yang, "Development and Application of On-line Weld Modeling Tool," *Welding in the World*, Vol. 53, pp. 67-75 (2009).
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45. W. Zhang, "Numerical Modeling of Heat Transfer, Fluid Flow and Microstructural Evolution during Fusion Welding of Alloys," *Welding in the World*, Vol. 50, pp. 12-22 (2006).
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48. W. Zhang, T. DebRoy, and J. W. Elmer: "Integrated Modeling of Thermal Cycles, Austenite Formation, Grain Growth and Decomposition in the Heat Affected Zone of Carbon Steel," *Science and Technology of Welding and Joining*, Vol. 10, p. 574 (2005).
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50. J. W. Elmer, T. A. Palmer, S. S. Babu, W. Zhang, and T. DebRoy: "Phase transformation dynamics during welding of Ti-6Al-4V," *Journal of Applied Physics*, Vol. 95, p. 8327 (2004).
51. W. Zhang, C.-H. Kim and T. DebRoy: "Heat and fluid flow in complex joints during gas metal arc welding - Part II: Application to fillet welding of mild steel," *Journal of Applied Physics*, Vol. 95, p. 5220 (2004).
52. W. Zhang, C.-H. Kim and T. DebRoy: "Heat and Fluid Flow in Complex Joints during Gas-Metal Arc Welding,

Part I: Numerical Model of Fillet Welding,” *Journal of Applied Physics*, Vol. 95, p. 5210 (2004).

53. J. W. Elmer, T. A. Palmer, S. S. Babu, W. Zhang, and T. DebRoy: “Direct observations of austenite, bainite, and martensite formation during arc welding of 1045 steel using time-resolved X-ray diffraction,” *Welding Journal*, Vol. 83, p. 244-s (2004).
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55. J. W. Elmer, T. A. Palmer, W. Zhang *et al.*: “Kinetic modeling of phase transformations occurring in the HAZ of C-Mn steel welds based on direct observations,” *Acta Materialia*, Vol. 51, p. 3333 (2003).
56. W. Zhang, G. G. Roy, J. W. Elmer and T. DebRoy: “Modeling of Heat Transfer and Fluid Flow During Gas Tungsten Arc Spot Welding of Low Carbon Steel,” *Journal of Applied Physics*, Vol. 93, p. 3022, (2003).
57. W. Zhang, J. W. Elmer, and T. DebRoy: “Modeling and Real Time Mapping of Phases during GTA Welding of 1005 Steel,” *Materials Science and Engineering A*, Vol. 333, p. 320 (2002).
58. W. Zhang, J. W. Elmer, and T. DebRoy: “Kinetics of ferrite to austenite transformation during welding of 1005 steel,” *Scripta Materialia*, Vol. 46, p. 753 (2002).

Conference Proceedings:

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2. C. Zhao, X. Liu, W. Cao, W. Zhang, J. W. Sowards, Material Flow Behavior Modelling and Strain Distribution Prediction During Self-Reacting Friction Stir Welding Process Based on Computational Fluid Dynamics Method, In Proceedings of the ASME 2020 15th International Manufacturing Science and Engineering Conference, June 22-26, 2020, Cincinnati, OH, USA.
3. Y. Lu, J. Tran, E. Mayton, M. Kimchi, and W. Zhang, Process optimization for dissimilar metal joining of aluminum to steel by ultrasonic plus resistance spot welding, Proceedings of 2018 AWS Sheet Metal Welding Conference XVIII, Oct. 17-18, 2018, Livonia, MI, USA.
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10. T.D. Huang, ..., **W. Zhang et al.**, "Robust Distortion Control Methods and Implementation for Construction of Lightweight Metallic Structures," In: *Proceedings of 2016 SNAME Maritime Convention*, Providence, RI, November 1-5, 2016.
11. S. Wu, H. Gao, W. Zhang and Y. Zhang, "Real-time estimation of weld penetration using weld pool surface based calibration," In: *Proceedings of 42nd Annual Conference of the IEEE Industrial Electronics Society*, Florence, Italy, Oct. 2016.
12. Y. Li, **W. Zhang**, Y. Lee, J. Marchal and S. Kelly, "Meso-scale modeling of formation of balling defect in laser-powder bed fusion additive manufacturing," In: *the 10th International Conference on Trends in Welding Research*, Tokyo, Japan, Oct. 2016.
13. T. E. Borchers and **W. Zhang**, "Fused-Overlap Zone in Aluminum Arc Welds: Tendency of Formation and Effect on Corrosion," In: *the 10th International Conference on Trends in Welding Research*, Tokyo, Japan, Oct. 2016.
14. Y. Lu, A. Peer, T. Abke, M. Kimchi and **W. Zhang**, "Heat-Affected Zone Microstructure and Local Constitutive Behaviors of Resistance Spot Welded Hot-Stamped Steel," In: *Sheet Metal Welding Conference XVII*, Livonia, MI, October 19-22, 2016.
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39. **W. Zhang**, W. Gan, Y. Yang et al., Integrated computational modeling for fabrication and service life extension of pipe and tube for energy applications, In: *Proceedings of Conference on Pipe and Tube Houston 2007: Seamless and Welded Technology for Global Markets*, Vol. 2, pp. 917-942 (2007).
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Industry Standards:

1. S. S. Babu, **W. Zhang**, et al., "AWS A9.5 Guide for Verification and Validation in Computational Weld Mechanics," American Welding Society A9 Committee, 2013.

Handbooks Chapters:

1. D. Farson, **W. Zhang**, et al., "Physics of Welding and Cutting," updated and revised from the chapter of the same title, 2001, in *Welding Handbook Volume 1: Welding Technology*, American Welding Society (AWS), p. 57 (2019).
2. **W. Zhang**, R. Rai, A. Kumar and I. V. Krivtsun: "Modeling of Heat and Mass Transfer in Fusion Welding," in *ASM Handbook, Volume 6A Welding Fundamentals and Processes*, ASM International, pp. 766-786 (2011).
3. **W. Zhang**, "Fluid Flow Phenomena during Welding," updated and revised from the chapter of the same title by C.R. Heiple and P. Burgardt, 1993, in *ASM Handbook, Volume 6A Welding Fundamentals and Processes*, ASM International, pp. 89-95 (2011).

Technical Reports:

1. **W. Zhang**, M. J. Mills, H. C. Whitt, T. Payton, K. Zhang, Y. Wang and Z. Feng, Fundamental Understanding of Creep-Fatigue Interactions in 9Cr-1MoV Steel Welds, Final Report of Project No. 13-4948, The Ohio State University, DOE Nuclear Energy Reactor Concepts Research Development and Demonstration (RCRD&D), 2019.
2. Z. Feng, **W. Zhang**, J.A. Wang and F. Ren, Manufacturing Cost Analysis of Novel Steel/Concrete Composite Vessel for Stationary Storage of High-Pressure Hydrogen, ORNL/TM-2013/113, Oak Ridge National Laboratory (2013).
3. Q.F. Zhang, B.T. Smith and **W. Zhang**, Small Hydro Reference Model Project, ORNL/TM-2012/501, Oak Ridge National Laboratory (2012).

4. J.A. Wang, T. Tan, H. Jiang, **W. Zhang** and Z. Feng, Developing Fatigue Pre-crack Procedure to Evaluate Fracture Toughness of Pipeline Steels Using Spiral Notch Torsion Test, ORNL/TM-2012/337, Oak Ridge National Laboratory (2012).
5. J.A. Warren, S. Das and **W. Zhang**, Manufacturing Process Modeling of 100-400 kWe Combined Heat and Power Stationary Fuel Cells, ORNL/TM-2012/230, Oak Ridge National Laboratory (2012).
6. S.S. Babu, G. Sonnenberg, C. Schwenk, ..., **W. Zhang** et al., How can computational weld mechanics help industry? *Welding Journal*, Volume 89, pp. 40-45 (2010).

Invited talks, Keynotes, Seminars and Lectures

1. W. Zhang, X. Gao et al., Numerical Simulation of Solidification Microstructure of Nickel Base Superalloy Considering Non-spherical Particles in Laser-powder Bed Fusion, The II International Conference on Simulation for Additive Manufacturing, Pavia, Italy, Sept. 11-13, 2019.
2. W. Zhang and M. Kimchi, Developments in RW processes for light weight automotive structures and dissimilar materials, IIW Commission III, Detroit, March 6-7, 2019.
3. M. Kimchi, A. Peer, Y. Lu, W. Zhang et al., *RSW of Advanced and Dissimilar Automotive Materials - Case Studies*, 5th Lightweight Materials and EV Body Structures Manufacturing Technologies Summit, Feb. 21-22, 2018.
4. T. Borchers, W. Zhang, A. Seid and P. Shafer, *Formation and mitigation of stress corrosion cracking in MIG welded 7xxx series aluminum alloys*, Automotive Circle Conference "Insight @ Honda R&D Americas, Inc. 2017", Nov. 2017.
5. *Heat Transfer and Fluid Flow during Fabrication of Overhang Structure in Laser-Powder Bed Fusion Additive Manufacturing*, Materials Science and Technology (MS&T) Conference, Oct. 2017.
6. *Physics-based Model for Laser Additive Manufacturing - Needs for Material Property Data and in-situ Experimental Measurement*, NIST Instrumented Laser Joining Workshop, July 2017.
7. *Simulation of Deformation and Fracture Behaviors in Resistance Spot Weld of Advanced High-Strength Steel*, 70th IIW International Conference, Shanghai, China, June 2017.
8. *Meso-scale Modeling of Formation of Balling Defect in Laser-Powder Bed Fusion Additive Manufacturing*, Materials Science & Engineering Seminar, Youngstown State University, April 2017.
9. *Light Automotive Structures – Welding and Analysis*, AWS Workshop on Welding/Joining Advanced Materials for the Automotive Industry, Jan. 2017.
10. *Empowering Students with Computational Modeling Tools for Welding Design and Analysis*, AWS Adams Memorial Lecture, Nov. 2016.
11. *Meso-scale modeling of formation of balling defect in laser-powder bed fusion additive manufacturing*, Invited Talk in Additive Manufacturing, 10th International Conference on Trends in Welding Research, Tokyo, Japan, Oct. 2016.
12. *Numerical Modeling of Welding and Additive Manufacturing*, AWS Workshop on Welding of Advanced Materials, Miami, FL, January 13, 2016.
13. *Effect of Alloying Elements in Determination of Melt Pool Characteristics*, TMS Workshop on Simulation of Additive Manufacturing Technologies, Louisville, KY, August 24-28, 2015.
14. *Neutron Diffraction: Experiments and Simulation of Residual Stresses in Directed Metal Deposition and Welding Processes*, TMS Workshop on Simulation of Additive Manufacturing Technologies, Louisville, KY, August 24-28, 2015.
15. *Toward an Improved Understanding of Weldability of Advanced Structural Materials*, International Symposium on Advanced Manufacture Technology in Aerospace, Shanghai, China (May 2014).
16. *Welding and Additive Manufacturing of Advanced Structural Metals*, OSU Materials Week Conference, Columbus, OH (May 2014).
17. *Multiphysics Modeling of Welding Processes - Challenges and Opportunities for Widespread Deployment in Industry*, NIST, Boulder, CO (Jan. 2014).

18. *Integrated Computational Materials Engineering of Welding Processes and Welded Materials*, Colloquium at Department of Materials Science and Engineering, Pennsylvania State University, Oct. 2013.

2. CLASSROOM TEACHING

- WE4202/7202 - Welding Design (3 credits), **Undergraduate (UG) Core Course**
- WE4115/7115 - Computational Modeling of Welding Processes & Materials (3 credits)
- WE4021/7021 - Solid-State Welding (3 credits)
- WE4240/7240 - Fitness-for-Service of Welded Structures (2 credits)
- WE7895 - WE Graduate Seminar (1 credit)

3. SERVICE

PROFESSIONAL SOCIETIES

- Chair of AWS - A9 Computational Weld Mechanics Committee (2014-2019), member (2009-2013) (Developing standards for computational weld mechanics)
- Members of AWS Committees:
 - Welding Research & Development Committee since 2011 (judging AWS Graduate Research Fellowships)
 - Technical Papers Committee since 2014 (organizing Professional Programs and Special Symposiums)
 - Awards Committee since 2012 (judging Prof. Koichi Masubuchi Awards and Adams Memorial Awards)
 - Fellow Committee since 2019
 - Education Committee since 2013

JOURNAL REVIEWER

- Editorial Board for Journal - Science and Technology of Welding and Joining since 2004 (Journal impact factor 2.358 in 2018)
- Principal Reviewer for Welding Journal since 2014 (Journal impact factor 1.340 in 2019)
- Reviewer for journals:

* Metallurgical and Materials Transactions A	* Materials & Design
* Modelling and Simulation in Materials Science & Engineering	* Journal of Materials Processing Technology
* Scripta Materialia	* Acta Materialia
* Additive Manufacturing	* International Journal of Heat & Mass Transfer
* Corrosion	* Journal of Manufacturing Processes
* Computational Materials Science	* npj Computational Materials
* International Journal of Fatigue	

CONFERENCE ORGANIZER

- Lead organizer of symposia for:
 - AWS Workshop on Weld Residual Stress and Distortion Prediction, Lehigh University, Bethlehem, PA, August 10, 2015.
 - AWS Symposium on Advances in Weldability and Welding Metallurgy, Chicago, IL, Nov. 09-12, 2015.
 - AWS Symposium on Advances in Welding Science, Metallurgy and Technology, Chicago, IL, Nov. 2017.
- Co-organizer for AWS Annual Professional Program since 2015.
- Co-organizer for NIST Instrumented Laser Joining Workshop July 2017.

REVIEWER FOR FEDERAL AGENCIES

- Invited panelist, American Makes Roadmapping (March 2020).
- Invited panelist, National Science Foundation (NSF) Career Program (Nov. 2019).
- Invited panelist, NASA 2040 Vision for Multi-scale Materials and Structural Modeling (2017-present).
- Reviewer of proposals for
 - DOE NEUP Proposals (2016 - 2018).
 - DOE SBIR/STTR Phase I and Phase II proposals (2011 and 2016).
 - DOE's Office of Energy Efficiency and Renewable Energy (EERE) Postdoctoral Fellowships (2012).