

## Xiaosheng Gao

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### Professional Preparation

Xi'an Jiaotong University, Xi'an, China	Engineering Mechanics	B.S., 1987
Xi'an Jiaotong University, Xi'an, China	Solid Mechanics	M.S., 1990
Brown University, Providence, RI	Applied Mathematics	M.S., 1995
Brown University, Providence, RI	Solid Mechanics	Ph.D., 1998
University of Illinois, Urbana, IL	Structural Engineering	Postdoc, 1998-2000

### Appointments

Since 8/2011	Professor of Mechanical Engineering, University of Akron
Summer 2007	Office of Naval Research Summer Faculty Fellow
8/2006-7/2011	Associate Professor of Mechanical Engineering, University of Akron
Summer 2006	Office of Naval Research Summer Faculty Fellow

Gao, X. and Fu, Y. "Ballistic Materials Having a Three-Dimensional Sphere Structure", Patent No.: US 9846014 B2, Dec. 19, 2017.

**(ii) Book Chapters:**

Gao, X. Probabilistic Modeling of Cleavage Fracture in the Ductile-to-Brittle Transition Region, Chapter 5 (pp. 161-177) of "Structural Materials and Engineering" (ISBN 978-1-60692-927-8), Nova Science Publishers, 2009.

**(iii) Journal Articles:**

- J1. Miao, Y., Lv, S., Srivatsan, T.S. and Gao, X. (2019) The Mechanical and Electrochemical Coupled Pitting Behavior of a 2219 Aluminum Alloy: A Theoretical and Experimental Study. Accepted for publication in Journal of Engineering Materials and Technology.
- J2. Zeng, Chuan and Gao, X. (2019) Effect of the Deformation Dependent Permittivity on the Actuation of a Pre-Stretched Circular Dielectric Actuator. Accepted for publication in Mechanics Research Communications.
- J3. Huang C. and Gao, X. (2019) Development of a Phase Field Method for Modeling Brittle and Ductile Fracture. Computational Materials Science. Article 109089, DOI: <https://doi.org/10.1016/j.commatsci.2019.109089>.
- J4. Li, Z., Lv, S., Gao, X. and Srivatsan, T.S. (2019) Influence of Surface Quality on Pitting Corrosion Behavior of an Aluminum Alloy. Emerging Materials Research, 8(2), 206–211. <https://doi.org/10.1680/jemmr.19.00022>.
- J5. Li, Z., Lv, S., Zhang, W., Gao, X. and Srivatsan, T.S. (2019) Influence of Environment on Response Characteristics of a High Strength Aluminum Alloy. Emerging Materials Research, 8(2), 175–187. <https://doi.org/10.1680/jemmr.18.00173>.
- J6. Luo, T., Huang, C. and Gao, X. (2019) An Investigation of the Effect of Hydrogen on Ductile Fracture Using a Unit Cell Model. International Journal of Hydrogen Energy, 44, 8627-8640. <https://doi.org/10.1016/j.ijhydene.2019.02.069>.
- J7. Liu, J., Zhong, D., Li, Y., Tang, Z., Gao, X., Zhang Z. and Huang, F. (2019) Numerical Simulation and Test on Damage of Rotary Engine Blades Impacted by Bird. International Journal of Crashworthiness, 24(1), 106-120. DOI: 10.1080/13588265.2018.1452548.
- J8. Huang, C., Luo, T., Gao, X. and Graham, S.M. (2018) Modeling the Effect of Hydrogen on Ductile Fracture. Materials Performance and Characterization, 7(2), 101-118.
- J9. Liu, J., Li, Y., Yu, X., Gao, X. and Liu, Z. (2018) Design of Aircraft Structures against Threat of Bi

- J16. Zhai, J., Luo, T., Gao, X., Graham, S.M., Baral, M., Korkolis, Y.P. and Knudsen, E. (2016) Modeling the Ductile Damage Process in Commercially Pure Titanium. *International Journal of Solids and Structures*, 91, 26-45.
- J17. Reakes, C., Gao, X. and Srivatsan, T.S. (2016) Analysis of Threaded Fasteners of a High Strength Steel: Role of Flaw Size and Orientation – A Numerical Study. *Neural, Parallel, and Scientific Computations*, 24, 335-350.
- J18. Liu, J., Li, Y., Gao, X., Liu, P. and L. Kong (2015) Dynamic Response of Bird Strike on Aluminum Foam-Based Sandwich Panels. *International Journal of Crashworthiness*, 20, 325-336.
- J19. Wang, J., Guo, W.G., Gao, X. and Su, J. (2015) The Third-Type of Strain Aging and the Constitutive Modeling of a Q235B Steel over a Wide Range of Temperatures and Strain Rates. *International Journal of Plasticity*, 65, 85-107.
- J20. Fu, Y., Zhou, J. and Gao, X. (2014) Sandwiched hollow sphere structures: A study of ballistic

- J35. Zhang, T., Gao, X., Webler, B.A., Cockeram, B.V., Hayden, M. and Graham, S.M. (2012) Application of the Plasticity Models that Involve Three Stress Invariants. *International Journal of Applied Mechanics*, Vol. 4, No. 2: 1-24; DOI: 10.1142/S1758825112500214.
- J36. Graham, S.M., Zhang, T., Gao, X. and Hayden, M. (2012) Development of a Combined Tension–Torsion Experiment for Calibration of Ductile Fracture Models under Conditions of Low Triaxiality. *International Journal of Mechanical Sciences*, 54, 172-181.
- J37. Jiang, H., Gao, X. and Srivatsan, T.S. (2011) Enabling and Understanding Failure of Engineering Structures Using the Technique of Cohesive Elements. *International Journal of Engineering Sciences and Management*, 1, 1-14.
- J38. Gao, X., Zhang, T., Zhou, J., Graham, S.M., Hayden, M. and Roe, C. (2011) On Stress-State Dependent Plasticity Modeling: Significance of the Hydrostatic Stress, the Third Invariant of Stress Deviator and the Non-Associated Flow Rule. *International Journal of Plasticity*, 27, 217–231.
- J39. Hu, S., Jiang, H., Xia, Z. and Gao, X. (2010) Friction and Adhesion of Hierarchical Carbon Nanotube Structures for Biomimetic Dry Adhesives: Multiscale Modeling. *ACS Applied Materials and Interfaces*, 2, 2570-2578.
- J40. Jiang, H., Gao, X. and Srivatsan, T.S. (2010) A Cohesive Zone Model for Studying Crack Growth in Materials and Structures. *Neural, Parallel, and Scientific Computations*, 18, 291–306.
- J41. Gao, X. (2010) Fracture Assessment of Ferritic Steel Components under Dynamic Loading. *International Journal of Pressure Vessels and Piping*, 87, 511-519.
- J42. Stearns, J., Gao, X., Srivatsan, T.S., and Lam, P.C. (2010) The Mechanical Response of a Rotating Wheel: Influence of Inflation Pressure and Radial Loads. *International Journal of Vehicle Design*, 53, 166-180.
- J43. Gao, X., Zhang, G. and Roe, C. (2010) A Study on the Effect of the Stress State on Ductile Fracture. *International Journal of Damage Mechanics*, 19, 75-94.
- J44. Prakash, S., Gao, X. and

- J55. Gao, X., Zhang, G. and Srivatsan, T.S. (2006) A Probabilistic Model for Prediction of Cleavage Fracture in the Ductile-to-Brittle Transition Region and the Effect of Temperature on Model Parameters. *Materials Science and Engineering A*, 415, 264-272.
- J56. Stearns, J., Srivatsan, T.S., Gao, X., Prakash, A. and Lam, P.C. (2006) Understanding the Influence of Pressure and Radial Loads on Stress and Displacement Response of a Rotating Body: The Automobile Wheel. *International Journal of Rotating Machinery*, 2006, 1-8 (DOI: 10.1155/IJRM/2006/60193).
- J57. Gao, X. and Kim, J. (2006) Modeling of Ductile Fracture: Significance of Void Coalescence. *International Journal of Solids and Structures*, 43, 6277-6293.
- J58. Stearns, J., Srivatsan, T.S., Gao, X., Prakash, A. and Lam, P.C. (2005) Analysis of Stress and Strain Distribution in a Vehicle Wheel: Finite Element Analysis versus Experimental Method. *Journal of Strain Measurement*, 40(1), 1-12.

- J75. Gao, X., Faleskog, J., Dodds, R.H. and Shih, C.F. (1998) Ductile Tearing in Part-Through Cracks – Experiments and Cell-Model Predictions. *Engineering Fracture Mechanics*, 59, 761-777.
- J76. Gao, X., Faleskog, J. and Shih, C.F. (1998) Cell Model for Nonlinear Fracture Analysis – II. Fracture-Process Calibration and Verification. *International Journal of Fracture*, 89, 375-398.
- J77. Faleskog, J., Gao, X. and Shih, C.F. (1998) Cell Model for Nonlinear Fracture Analysis – I. Micromechanics Calibration. *International Journal of Fracture*, 89, 355-373.
- J78. Shih, C.F., Faleskog, J. and Gao, X. (1996) A Cell Model for Analyzing Material Failure. *GATHER / SCATTER*, 12, 18-19.
- J79. Gao, X., Shih, C.F., Tvergaard, V. and Needleman, A. (1996) Constraint Effects on the Ductile-Brittle Transition in Small Scale Yielding. *Journal of the Mechanics and Physics of Solids*, 44, 1255-1282.
- J80. Gao, X. and Kuang, Z.B. (1992) Mode I Fracture in Two Dissimilar Functional Non-homogeneous Planes. *Engineering Fracture Mechanics*, 42, 33-44.

**(iv) Conference Papers:**

- C1. Gao, X. (2018) Modeling the Effect of Stress State on Ductile Fracture. In *Advanced Plasticity, Damage, and Fracture with Applications (Proceedings of ICPDF'18: the 24th International Conferences on Plasticity, Damage, and Fracture; Eds. A.S. Khan; NEAT Press, ISBN: 978-0-9911654-5-2)*, 3 pages.
- C2. Gao, X., Huang, C., Luo, T. and Graham S.M. (2017) Modeling the Effect of Hydrogen on Ductile Fracture. In *Proceedings of the 17th International ASTM/ESIS Symposium on Fatigue and Fracture Mechanics (41th National Symposium on Fatigue and Fracture Mechanics), May 10-12, 2017, Toronto, Canada* (6 pages, CD-ROM).
- C3. Gao, X., Zhou, J. and Zhai, J. (2014) Modeling of Ductile Fracture at Engineering Scales: A Mechanism-Based Approach. Invited paper presented at the 2014 MRS Fall Meeting (Manuscript ID: 2031062; 12 pages) and published in *MRS Online Proceedings Library, Volume 1759, 2015, mrsf14-1759-xx04-05, doi: 10.1557/opl.2015.52*, Cambridge University Press.
- C4. Gao, X., Zhou, J. and Hayden, M. (2013) Modeling the Effect of Residual Stress on the Ductile Fracture Behavior of an Aluminum Alloy 5083-H116. In *Proceedings of the 13th International Conference on Fracture, June 16-21, 2013, Beijing, China (M10-002: 10 pages)*.
- C5. Gao, X. (2013) A Mechanism-Based Approach for Predicting Ductile Fracture of Metallic Alloys. In *Proceedings of the 13th International Conference on Fracture, June 16-21, 2013, Beijing, China (S12-020: 10 pages)*.
- C6. Gao, X. (2011) Modeling the Plastic Response of Metallic Alloys: Significance of the Hydrostatic Stress, the Third Invariant of Stress Deviator and the Non-associated Flow Rule. In *Macro to Nano-scale Inelastic Deformation and Failure of Materials & Multi-scale Modeling (Proceedings of the 17th International Symposium on Plasticity and its Current Applications; Eds. A.S. Khan; NEAT Press, ISBN: 0-9659463-1-2)*, pp. 103-105.
- C7. Gao, X., Zhang, T., Roe, C. and Hayden, M. (2009) Effect of the Lode Parameter on Ductile Fracture. In *Proceedings of the 12th International Conference on Fracture, July 12-17, 2009, Ottawa, Canada (Paper ID: 794.573.00)*.
- C8. Gao, X., Petti, J. and Dodds, R.H. (2008) The Weibull Stress Model for Predicting Cleavage Fracture in the Ductile-to-Brittle Transition Region. In *Proceedings of the ASME Pressure Vessels and Piping Conference – 2008, Vol. 6, PT A and B, pp. 927-936 (Paper ID: PVP2008-61080)*.
- C9. Gao, X. and Roe, C. (2008) Effect of Stress State on Ductile Fracture. In *Mechanics & Mechanisms of Finite Plastic Deformation (Proceedings of the 14th International Symposium on Plasticity and its Current Applications; Eds. A.S. Khan and B. Farrokh; NEAT Press, ISBN: 0-9659463-8-X)*, pp. 118-120.
- C10. Gao, X., Zhang, G. and Srivatsan, T.S. (2006) Prediction of Cleavage Fracture in the Ductile-to-Brittle Transition Region of Pressure Vessel Steels: A Probabilistic Model. In *Proceedings of the 5th International Conference on Fracture and Damage Mechanics (FDM 2006), Sept. 13-15, Harbin, China*.



- C24. Gao, X. and Dodds, R.H. (2000) Effects of Loading Rate on the Weibull Stress Model for Simulation of Cleavage Fracture in Ferritic Steels. In Fracture, Fatigue and Weld Residual Stress, ASME PVP-412, pp. 125-132.
- C25. Gao, X., Dodds, R.H., Tregoning, R.L., Joyce, J.A. and Link, R.E. (1999) Cleavage Fracture in Surface Cracked Plates: Experiments and Numerical Predictions. In Fracture, Fatigue and Weld Residual Stress, ASME PVP-393 (edited by J. Pan), pp. 11-16.
- C26. Dodds, R.H., Gao, X., Faleskog, J., Shih, C.F. and Gullerud, A. (1998) 3-D Modeling of Ductile Fracture in Metals. In Proceedings of the ASCE 12th Engineering Mechanics Conference, May 17-20, 1998, La Jolla, California.
- C27. Shih, C.F., Cheng, L., Faleskog, J. and Gao, X. (1997) A Cell Model for Ductile Fracture with Applications. In Advances in Fracture Research (Proceedings of the 9th International Conference on Fracture, April 1-5, 1997, Sydney, Australia; Eds. B.L. Karihaloo, Y.W. Mai, M.I. Ripley and R.O. Ritchie), 4, pp. 1935-1946.

**(v) Invited Talks / Keynote Speeches:**

1. Gao, X. Modeling the effect of stress state on ductile fracture, keynote lecture at the 24th International Conference on Plasticity, Damage and Fracture, Jan. 3-8, 2018, San Juan, Puerto Rico.
2. Gao, X. Recent Developments in Plasticity and Ductile Fracture Modeling, special keynote speaker at the 2nd International Conference & Exhibition on Fatigue, Durability and Fracture Mechanics, Sept. 28-30, 2013, Sana alure, -13.l(nat)-13nd8 (h)-12.3 (i)3a.2 (.)TJ0 Tc 0(h)0725.53 0 Td( )TjEMC /LBody