# YUANLI BAI

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## EDUCATION

**Massachusetts Institute of Technology (MIT)**, Cambridge, MA
Ph.D. in Mechanical Engineering, August, 2003 – February, 2008
**Tsinghua University**, Beijing, China
B.S. (honors) in Automotive Engineering, September, 1996 –July, 2000
M.S.(honors) in Vehicle Engineering, September, 2000 – July, 2003

## WORKING EXPERIENCE

**University of Central Florida**, Orlando, FL, Jan. 2011 – Now
Assistant Professor, Department of Mechanical and Aerospace Engineering
Director of the Lab of Solid and Structure Mechanics
**General Electric Global Research Center**, Niskayuna, NY, Feb. 2008 – Dec. 2010
Mechanical Engineer, Composites Design and Process Lab, Material and System Technologies Organization
- Bird/ice/hail impact analysis and finite element simulation for critical structures of aircraft engines.
- Material characterization and modeling for high performance composite laminates.
- Wind turbine blades analysis for general wind loads and fatigue.

**Massachusetts Institute of Technology**, Cambridge, MA, Sept. 2003 – Jan. 2008
Research Assistant, Impact & Crashworthiness Lab, Department of Mechanical Engineering
- Experimental and theoretical studies on metal plasticity model and ductile fracture modeling
- Loading history effects on ductile fracture and metal sheet forming, and crack propagation
- Development of new fracture experimental technologies.

**General Electric Global Research Center**, Niskayuna, NY, July 2005 – Sept. 2005
Summer intern, Advanced Material System Application Lab
- Ice/hail strike finite element analysis for the compressor blades of aircraft engines.

**Tsinghua University**, Beijing, China, Sept. 1999 – June 2003
Research Assistant, Vehicle Impact Lab (National key laboratory in automotive safety and energy of China)
- Finite element simulation of airbags and automotive structures in crash
- Software development for airbag fold modeling and digital signal processing
- Experimental studies on automotive crash safety.

## TEACHING EXPERIENCE

**University of Central Florida**, Orlando, FL
- EGM3601, Solid mechanics, spring 2011, spring 2013, summer2016

- EML3500, Machine Design and Analysis, spring 2014, fall 2014, spring2015, summer2015, fall2016
- EAS 3990/EML 3990, AE/ME Career Faculty Advising I, **every semester** since fall 2012
- EML5237, Intermediate Mechanics of Materials, spring 2012, fall 2013, fall2015
- EML5937, Turbomachinery Integrity and Reliability, spring 2012
- EML6067, Finite element Analysis in mechanical, materials and aerospace engineering I, fall 2013, spring2015, spring2017.
- EML6068, Nonlinear finite elements in mechanical, materials and aerospace engineering II, fall 2011, fall 2014
- EGM6653, Elasticity and Plasticity, fall 2012, spring 2014, spring2016
- EML6918, Directed Research, every semester.

**Massachusetts Institute of Technology**, Cambridge, MA

- Graduate Teaching Assistant, 2.080J, Structural Mechanics, Sept. 2005 – Jan. 2006.

## RESEARCH INTERESTS

- Constitutive modeling and testing of plasticity and fracture for emerging materials including metals and composites
- Lightweight designs, structural impact and crashworthiness, sheet metal formability
- Multi-scale finite element analysis (FEA) and material subroutine development
- Mechanics of soft tissue materials with medical simulation applications
- High velocity impact, hard body and soft body impact
- Experimental techniques development, Optical Measurement and its application
- Design of rotating structures and gear box

## HONORS

- US Air Force Summer Faculty Fellowship, 2013
- The First Class Winner of 2009 Asian Pacific American Forum (APAF) Growth Competition, General Electric, Global Research Center, Niskayuna, NY. Feb. 2009.
- The Second Class Award in Scientific Advance for Chinese Automotive Industry, (work in the project of impact safety improvement for Jinbei SY6480 mini bus), Department of Automotive Industry, China, 2003.
- Excellent Graduate Student of Tsinghua University, Tsinghua University, Beijing, China, July 2003.
- Excellent Undergraduate Student of Tsinghua University, Tsinghua University, Beijing, China, July 2000.

## JOURNAL PAPERS

Google scholar site: https://scholar.google.com/citations?user=_f0a1mwAAAAJ&hl=en

1. Qiao, Y., Liu, J., Jia, Y., Bai, Y., Xu, C., An, L., "Study on Coexistence of Brittle and Ductile Fractures in Nano Reinforcement Composites under Different Loading Conditions", *International Journal of Fracture,* April 2017**, 204** (2), pp 205–224.
2. Algarni, M., Choi, Y., Bai, Y., "A unified material model for multiaxial ductile fracture and extremely low cycle fatigue of Inconel 718", *International Journal of Fatigue*, March 2017, **96**: 162-177.
3. Jia, Y., Bai, Y., "Ductile fracture prediction for metal sheets using all-strain-based anisotropic eMMC

model", *International Journal of Mechanical Sciences*, 2016, **115**: 516–531.

4. Pan, H., Liu, J., Choi, Y., Xu, C., Bai, Y., and Atkins, T., "Zones of material separation in simulations of cutting", *International Journal of Mechanical Sciences,* 2016, **115**: 262-279.
5. Shabahang, S., Tao, G., Kaufman, J., Qiao, Y., Wei, L., Bouchenot, T., Gordon, A., Fink, Y., Bai, Y., Hoy, R., and Abouraddy, A., "Controlled fragmentation of multimaterial fibers and films via polymer cold-drawing", *Nature*, **June 2016**.
6. Jia, Y., and Bai, Y, "Experimental Study of the Mechanical Properties in AZ31B-H24 Magnesium Alloy Sheets under Various Loading Conditions", *International Journal of Fracture*, January 2016, **197**(1).
7. Long, X., Bai, Y., Alagrni, M., Choi, Y., Chen, Q., "Study on the Hardening Mechanisms of Cu/CNT Nano Composites", *Materials Science and Engineering: A*, October 2015, **645**:347-356.
8. Algarni, M., Bai, Y., Choi, Y. "A study of Inconel 718 dependency on stress triaxiality and Lode angle in plastic deformation and ductile fracture", *Engineering Fracture Mechanics*, 2015, **147**:140-157
9. Bai, Y., Wierzicki, T., "A comparative study of 3D prediction of ductile fracture by three groups of models", *Engineering Fracture Mechanics*, February 2015, **135**:147-167.
10. Jia, Y., Argueta-Morales, R., Liu, M., Bai, Y., Divo, E., Kassab, A.J., DeCampli, W.M, "Experimental Study of Anisotropic Stress/Strain Relationships of the Piglet Great Vessels and Relevance to Pediatric Congenital Heart Disease", *The Annals of Thoracic Surgery*, **99**(4): 1399–1407, April **2015**.
11. Liu, J., Bai, Y., and Xu, C., "Evaluation of Ductile Fracture Models on Finite Element Simulation of Metal Cutting Process", *Journal of Manufacturing Science and Engineering* (ASME Transaction), **vol. 136**:011010 (14 pages)**,** February 2014.
12. Kraft, S.M., Moslehy, F., Bai, Y., and Gordon, A.P., "Characterization of the Orthotropic Elastic Constants of a Micronic Woven Wire Mesh via Digital Image Correlation", *Experimental Mechanics*, **November, 2013**:501-514.
13. Jia, Y., Long, X., and Bai, Y., "Experimental study on mechanical properties of AZ31B-H24 magnesium alloy sheets under multi-axial loading conditions", *Journal of Automotive Safety and Energy*, December, 2012, **3**(4):390-400.
14. Bai, Y., Atkins, A.G., "Tension and Shear Cracking During Indentation of Ductile Materials by Opposed Wedges", *Engineering Fracture Mechanics,* 2012, **96**:49-60.
15. Bai, Y., Wierzbicki, T. "Application of Extended Mohr-Coulomb Criterion to Ductile Fracture", *International Journal of Fracture*, January 2010, **161**(1):1-20.
16. Beese, A. M., Luo M., Li, Y., Bai, Y., Wierzbicki, T, "Partially coupled anisotropic fracture model for aluminum sheets", *Engineering Fracture Mechanics*, 2010, **77**(7):1128-1152.
17. Bai, Y., Teng, X., and Wierzbicki, T., "On the application of stress triaxiality formula for plane strain fracture testing", *Journal of Engineering Materials and Technology* (ASME Transaction), April 2009, **131**(2): 021002.
18. Bai, Y., and Wierzbicki, T., "Forming Severity Concept for Predicting Sheet Necking under Complex Loading Histories", *International Journal of Mechanical Sciences*, 2008, **50**(6):1012-1022.
19. Bai, Y., Wierzbicki, T., "A New Model of Metal Plasticity and Fracture with Pressure and Lode Dependence", *International Journal of Plasticity*, 2008, **24**(6):1071-1096.
20. Teng, X., Mae, H., Bai, Y., and Wierzbicki, T., "Pore Size and Fracture Ductility of Aluminum Low Pressure Die Casting", *Engineering Fracture Mechanics*, 2009, **76**(8):983-996.

21. Teng, X., Mae, H., Bai, Y., and Wierzbicki, T., "Statistical Analysis of Ductile Fracture Properties of an Aluminum Casting", *Engineering Fracture Mechanics*, 2008, **75**(15):4610-4625.
22. Mae, H., Teng, X., Bai, Y. and Wierzbicki, T., "Comparison of Ductile Fracture Properties of Aluminum Castings: Sand Mold vs. Metal Mold", *International Journal of Solids and Structures*, 2008, **45**(5):1430-1444.
23. Mae, H., Teng, X., Bai, Y. and Wierzbicki, T., "Calibration of Ductile Fracture Properties of a Cast Aluminum Alloy", *Materials Science and Engineering: A*, June 2007, **459**(1-2):156-166.
24. Bai, Y., Bao, Y. and Wierzbicki, T., "Fracture of prismatic aluminum tubes under reverse straining", *International Journal of Impact Engineering*, 2006, **32**(5):671-701.
25. Wierzbicki, T., Bao, Y., Lee, Y., and Bai, Y., "Calibration and evaluation of seven fracture models", *International Journal of Mechanical Sciences,* 2005, **47**(4-5):719-743.
26. Zhang, J., Ma, C., Bai, Y., and Huang, S., "Airbag mapped mesh auto-flattening method", *Tsinghua Science & Technology*, Jun. **2005**: 387-390.
27. Ma, C., Huang, S., Zhang, J., and Bai, Y., "Research on Injury Criterions Prescribed in Automotive Frontal Crash Regulations", *Journal of Highway and Transportation Research and Development*, **2004**(01):96-99.
28. Bai, Y., Zhang, J. and Huang, S., "Mapping algorithm for airbag modeling with initial metric method", *Journal of Tsinghua University (Sci & Tech)*, Nov. **2002**.

## SELECTED REFEREED CONFERENCE PAPERS

1. Jia, Y., Qiao, Y., Pan, H., Chu, E., Bai, Y., "A Comprehensive Plasticity and Fracture Model for Metal Sheets under Multi-axial Stress and Non-Linear Strain Path", *SAE International Journal of Engines* 10 (#2017-01-0315), Presented on **SAE 2017** Conference, Detroit, MI.
2. Jia, Y., Wang, Y., Bai, Y, "A New Combined Isotropic, Kinematic and Cross Hardening Model for Advanced High Strength Steel under Non-Linear Strain Loading Path", *SAE International Journal of Engines* 10 (#2017-01-0367), Presented on **SAE 2017** Conference, Detroit, MI.
3. Jia, Y., Bai, Y., "A Combined Isotropic, Kinematic and Cross Hardening Model for Magnesium AZ31B-H24 under Non-linear Strain Loading Path", *Proceedings of* ***Numisheet 2016***, Brisol, UK, Sep. 4-9, 2016.
4. Jia, Y., Ghazali, S., Bai, Y., "Application of eMMC Model to Fracture of Metal Sheets", *Proceedings of the* ***2016 SEM*** *Annual Conference and Exposition on Experimental and Applied Mechanics*, Orlando FL, 2016.
5. Qiao, Y, Jia, Y, Argueta-Morales, R, Kassab AJ, Bai, Y, DeCampli, WM. Experimental Study of Anisotropic Mechanical Properties of Human Tissues with Application to Congenital Heart Disease. *World J Pediatr Congenit Heart Surg*. **2016;7**(2):283-284.
6. Jia, Y., Bai, Y., "A Combined Isotropic, Kinematic and Cross Hardening Model for BH240 and DP600 Steel Sheets", *International Deep-Drawing Research Group (****IDDRG 2015****),* May 31 – June 3, 2015, Shanghai, China.
7. Jia, Y., Bai, Y., Ma. C., Zhang, J., "Ductile fracture prediction for metal sheets using all-strain-based modified Mohr-Coulomb model", *International Deep-Drawing Research Group (****IDDRG 2015****),* May 31 – June 3, 2015, Shanghai, China.

8. Algarni, M.S., Jia, Y., Karl, J., Gordon, A.P., Bai, Y., "Linkage Between Ductile Fracture And Extremely Low Cycle Fatigue Of Inconel 718 Under Multiaxial Loading Conditions", **TMS2015**, Supplemental UE: TMS 2015 Conference Proceedings, March 15-19, 2015, Orlando, FL.
9. Hu, Y., Wu, T., Chow, L., Bai, Y., Wu, W., "Design of a 3kW 150k RPM Super High-Speed Permanent Magnet Synchronous Motor", **ICEM2014**, The XXI$^{th}$ International Conference on Electrical Machines, September 2-5, 2014, Berlin, Germany.
10. Jia, Y, Bai, Y.; Muralidharan, G., Muth, T. R. and Wang, Y., "Evaluation of Fracture Criteria of Mg-Alloy Sheets during Formability Testing", **TMS2014**, 143rd Annual meeting and exhibition, February 16-20, 2014, San Diego, California.
11. Jia, Y, Argueta-Morales, R, Liu, M, Kassab AJ, Divo, E, Bai, Y, DeCampli, WM. Experimental Study of Anisotropic Stress/Strain Relationships of the Piglet Great Vessels and Relevance to Congenital Heart Disease. *World J Pediatr Congenit Heart Surg*. **2014, 5**(1):178-79.
12. Liu, J., Bai, Y., Xu, C., "Evaluation of Ductile Fracture Models on Finite Element Simulation of Metal Cutting Process", Proceeding of the 2013 ASME International Manufacturing Science and Engineering Conference (**MSEC2013**), June 10-14, 2013, Madison, Wisconsin.
13. Bai, Y., Wierzbicki, T., "The Concept Of Damage Accumulation For Predicting Necking And Fracture Of Sheets", *International Deep-Drawing Research Group (**IDDRG 2013**),* June 2 – 5, 2013, Zurich, Switzerland.
14. Jia, Y., Long, X., Wang, K., and Bai, Y., "Calibration of Plasticity and Fracture of Magnesium Alloy Sheets Under Multi-Axial Loading Conditions", ***Plasticity 2013***, Nassau, Bahamas, Jan. 3-8, 2013.
15. Liu, H., Brokaw, W., Harms, J., Wu, W., Epstein, M., Chalfant, T., Camarano, A., Hu, Y., Bai, Y., Chow L., and Wu, T., "Design and Optimization of Permanent Magnet Switch Reluctance Machine for Renewable Energy Application", *International Conference on. Electrical Machines* (***ICEM2012***), Marseille, France, Sept. 2-5, 2012.
16. Bai, Y., "Fracture of 1045 Steel under Complex Loading History", *Proceedings of **Numisheet 2011***, Seoul, Korea, Aug. 21-26, 2011.
17. Bai, Y., Wierzbicki T., "Analytical Solution on the Failure of Strips under Bending and Tension", *Proceedings of **Numisheet 2011***, Seoul, Korea, Aug. 21-26, 2011.
18. Bai, Y., Wierzbicki, T., "Predicting Fracture of AHSS Sheets on the Punch and Die Radii and Sidewall", *Proceedings of **Numisheet 2008***, Interlaken, Switzerland, Sept. 1-5, 2008.
19. Kim, K., Bai, Y., and Wierzbicki, T., "Failure Characterization of TRIP780 and DP590 sheet steels", International Deep Drawing Research Group (***IDDRG 2009***) International Conference, Jun. 1-3, 2009, Golden, CO, USA.
20. Luo, M., Beese, A.M., Li, Y., Bai, Y., Wierzbicki, T., "Ductile Fracture Calibration and Prediction of Anisotropic Aluminum Sheets", To be published on the *Proceedings of the **2009 SEM** Annual Conference and Exposition on Experimental and Applied Mechanics*.
21. Wierzbicki, T., Beese, A., and Bai, Y., "A Comparative Study of Three Methods of Measuring Fracture Strain in Metals", *Proceedings of **Plasticity 2008***, The Fourteenth International Symposium on Plasticity and its Current Applications, Hawaii.
22. Mae, H., Teng, X., Bai, Y. and Wierzbicki, T. , "Calibration of Ductile Fracture Properties of Two Cast Aluminum Alloys", *Experimental Analysis of Nano and Engineering Materials and Structures,*

*Proceedings of the 13th International Conference on Experimental Mechanics,* Alexandroupolis, Greece, July 1–6, **2007**.

23. Wierzbicki, T., Bao, Y., and Bai, Y., "A new experimental technique for constructing a fracture envelope of metals under multi-axial loading", *Proceedings of the **2005 SEM** Annual Conference and Exposition on Experimental and Applied Mechanics*, 2005, 1295-1303.
24. Bai, Y., Huang, S., and Zhang, J., "Study on soil modeling under impact", *Proceedings of the 7th CSAE conference of vehicle impact safety*, Beijing, China, **2002**.

## INVITED TALKS

1. "Material plasticity and fracture theories, testing, and applications", Tsinghua University, Beijing, China, June, 4, 2015.
2. "Ductile fracture testing and modeling with application to high velocity impact analysis", Pratt & Whitney, East Hartford, CT, October, 31, 2013
3. "Application of Modified Mohr-Coulomb Necking Locus with Forming Severity Concept to Predict Metal Sheets Necking under Nonlinear Strain Paths", SES 50th Annual Meeting and ASME AMD summer meeting, Brown University, Providence, RI, July, 29, 2013
4. "Applications of Modified Mohr-Coulomb Model to Sheets Necking and Ductile Fracture Predictions under Nonlinear Loading Paths", ALCOA Technical Center, New Kensington, PA, July 22, 2013.
5. "Prediction of metal sheets necking, ductile fracture initiation and crack propagation under nonlinear loading paths", ArcelorMittal R&D Center, East Chicago, IN, July 1, 2013.
6. "Prediction of metal sheets necking, ductile fracture initiation and crack propagation under nonlinear loading paths", General Motors, Technical Center, Warren, MI, June, 20, 2013.
7. "Fracture Mechanics and Its Application to Gas Turbines", SIEMENS energy Inc., Orlando, FL, May 7, 2013.
8. "Comparison of 12 Fracture Models in the 3D Space", MIT Workshop on Experimental and Computational, Fracture Mechanics, Cambridge, MA, Oct. 6, 2011

## SERVICES

**UCF services**

- Serve as one of the two CECS faculty representatives on the Undergraduate Course Review Committee (UCRC) at UCF, 2016-2017.
- Organizer of MAE Research Day of 2016.
- Faculty search committee, Fall 2014, Summer 2015
- Graduate committee member of the department, 2012-2017

**Conference Organization**

- Subsection chair, The 8th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes (***Numisheet 2011)***, Seoul, Korea, Aug. 21-26, 2011
- Organizer of mini symposium on "Fracture and damage in sheet metal forming and applications", The 9th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes (**Numisheet 2014**), Melbourne, Australia, January 6-10, 2014

- Organizer of mini symposium on "Ductile Fracture and Damage in Sheet Metal Forming and Applications", International Symposium on Plasticity, (**Plasticity 2014**), Freeport, Bahamas, January 3-8, 2014.
- Coordinated the 3rd (2006) and 4th (2007) MIT Workshop on Experimental and Computational, Fracture Mechanics, Cambridge, MA

**Reviewer**

- NSF ad hoc panel review, Centers of Research Excellence in Science and Technology (CREST) and HBCU Research Infrastructure for Science and Engineering (RISE), September 2016.
- NSF proposal review panel, Mechanics of Materials Program (CMMI, 07/2011, 04/2014, 04/2015).
- ASME MSEC 2013, Symposium on Advances in Modeling, Analysis and Simulation of Manufacturing Processes.
- **Actively reviewing papers for top mechanics journals (~ 20 papers /year), for example:**
  International Journal of Plasticity (IJP)
  International Journal of Impact Engineering (IJIE)
  Engineering Fracture Mechanics (EFM)
  Internal Journal of Mechanical Science (IJMS)
  International Journal of Solids and Structures (IJSS)
  International Journal of Damage Mechanics (IJDM)
  Acta Mechanica Solida Sinica
  Experimental Mechanics (EM)
  Journal of Materials Processing Technology (JMPT)
  Journal of Applied Mechanics, ASME (JAM-ASME)
  Mechanics Research Communications
  Zeitschrift fuer Angewandte Mathematik und Mechanik (ZAMM)
  Journal of Nanomechanics and Micromechanics