

# Curriculum Vitae

---

## A. PERSONAL INFORMATION

**NAME** Xijia Wu, B.Sc., M. Sc., Ph.D.

**DATE OF BIRTH** 8 March 1958

**CITIZENSHIP** Canadian

**LANGUAGES** English, Chinese

**HOME ADDRESS** 140 Forestglade Cres., Ottawa, ON, Canada K1G 6A5  
Tel: (613) 736-6602

**BUSINESS** Structures and Materials Performance Laboratory  
Aerospace Portfolio  
National Research Council of Canada  
Bldg. M13, 1500 Montreal Road  
Ottawa, ON, Canada K1A 0R6  
Tel: (613) 990-5051  
Fax: (613) 990-7444  
Email: xijia.wu@nrc-cnrc.gc.ca

## B. ACADEMIC EDUCATION

### Ph. D. 1992

Dept. Mechanical Engineering, University of Ottawa, Ottawa, ON

- Constitutive Laws of Plastic Deformation and Fracture (Supervisor: A.S. Krausz)

### M. Sc. 1985

Institute of Mechanics, Chinese Academy of Sciences, Beijing, China

- Fracture Mechanics Analysis of Shells (Supervisor: C.T. Liu)

## **B.Sc. 1982**

- Dept. Modern Mechanics, University of Sci. & Tech. Of China, Hefei, Anhui, China

## **C. PROFESSIONAL EMPLOYMENT**

<b>1999–present</b>	Senior Research Officer, NRC Aerospace Portfolio
<b>1995–1997</b>	Research Officer Structures, Materials and Propulsion Laboratory NRC Institute for Aerospace Research, Ottawa, ON
<b>1992–1995</b>	NSERC Visiting Fellow Structures, Materials and Propulsion Laboratory NRC Institute for Aerospace Research
<b>1988–1992</b>	Research & Teaching Assistant Department of Mechanical Engineering, University of Ottawa, Ottawa, ON
<b>1985–1988</b>	Research Associate Institute of Mechanics, Chinese Academy of Sciences, Beijing, China

## **D. RESEARCH ACCOMPLISHMENT**

**Fatigue crack growth:** developed a transgranular fatigue crack growth model based on restricted slip reversibility; extended the model to characterize FCG in Al-Li alloys with texture; developed a power-law load-shedding procedure to investigate fatigue threshold, which is now being discussed in ASTM E08 committee as an alternative to the conventional (exponential) load-shedding procedure.

**Fracture Mechanics:** developed continuously-distributed dislocation theory solutions for Griffith-Inglis-type and Zener-Stroh-Koehler-type elastic-plastic crack problems in anisotropic materials (e.g., Ni-base single crystal superalloys for gas turbine blade application); developed a higher-order plane stress theory (considering antiplane shear) and applied the theory to characterize crack-bridging mechanism in fiber-metal laminates.

**Aluminum technology:** developed time-temperature-phase transformation model for 7xxx series aluminum alloys and implemented it for retrogression and re-aging treatment to boost the corrosion resistance of this class of alloys (1 patent).

**Constitutive law and life prediction:** developed deformation- mechanism-based constitutive laws for gas turbine material behaviors including plasticity, creep and thermomechanical fatigue (TMF); developed physics-based creep-fatigue interaction model, where the roles of physical damage mechanisms such as alternating slip, grain boundary sliding and oxidation are considered to formulate life prediction involving crack nucleation, propagation and coalescence in gas turbine materials.

## **E. COLLABORATION WITH CARLETON**

### Activities of collaboration

- Co-supervise students and research fellows with the faculty members of Carleton University
- Offer testing facilities of NRC such as scanning electron microscope (SEM), powder metallurgy sintering furnace, pin-on-disc tribometer, erosion testing machine, high temperature tensile testing machine, three-point bending fatigue tester, etc.

### Completed research projects and co-supervised students and research fellows

- High-temperature wear resistance of Stellite alloys, collaborated with Prof. R. Liu, supervising Samit Kapoor (M.A.Sc.), 2009 ~ 2011
- Fracture mechanics modeling of brittle coating/ductile substrate systems, collaborated with Prof. R. Liu, supervising Natalia Demidova (Ph.D.), 2006 ~ 2009
- Coating strength tests for journal bushings, collaborated with Prof. R. Liu, supervising Shengqi Xi (Postdoctoral fellow), 2006 ~ 2007
- Coating interface evaluation and failure analyses, collaborated with Prof. R. Liu, supervising Azidah Puteri Buang (M.A.Sc.), 2005 ~ 2008
- Polymer composite materials for journal bearing components, collaborated with Prof. R. Liu, supervising Alireza Khoddamzadeh (M.A.Sc.), 2005 ~ 2007
- Lead-free Tribaloy alloy/bronze bearing materials, collaborated with Prof. R. Liu, supervising Arash Tavakoli (M.A.Sc.), 2005 ~ 2007
- Tensile and wear performance evaluation of superalloys, collaborated with Prof. R. Liu, supervising Ping Huang (Visiting scholar), 2005 ~ 2006

- Material degradation in deformation and wear, collaborated with Prof. R. Liu, supervising Zhong Zhang (Postdoctoral fellow), 2004 ~ 2006
- Crack closure theory of shell structures, collaborated with Prof. R. Liu, supervising Jun Zhao (Ph.D.), 2003 ~ 2006
- Wear resistance of Triballoy alloys, collaborated with Prof. R. Liu, supervising Wei Xu (M.A.Sc.), 2003 ~ 2005
- Development of superalloy composites, collaborated with Prof. R. Liu, supervising Yi Ning (M.A.Sc.), 2002 ~ 2004
- Numerical solutions to shell fracture mechanics, collaborated with Prof. R. Liu, supervising Tie Zhang (Postdoctoral fellow), 2002 ~ 2003
- Short cracks in single crystal alloys, collaborated with Prof. R. Liu, supervising Jun Zhao (M.A.Sc.), 2001 ~ 2003
- Modeling Short Crack Growth in Ni-Base Single Crystal Superalloys with Prof. J. Beddoes supervising on Scott Yandt (2003 to 2010)

*Collaboration activities in progress and in planning*

- Metal-on-metal bearings for orthopedic implants, collaborated with Prof. R. Liu, supervising Peishan Hu (M.A.Sc.), 2011 ~ 2013
- Temperature-dependence mechanical characterization of superalloys and their coatings, collaborated with Prof. R. Liu, supervising a Ph.D. student, 2013 ~ 2016
- Combustor hot corrosion modeling with Prof. Henry Saari, part of CRIAQ research program
- Willing to be a Session Lecturer for both graduate and undergraduate courses
- Willing to be a Lead Engineer of the Fourth Year Capstone courses

## **F. RESEARCH PUBLICATION**

(a) Articles in Refereed Publications:

*Submitted to Refereed Journals:*

1. S. Kapoor, R. Liu, X.J. Wu, High-temperature hardness and wear resistance of newly developed high-tungsten Stellite alloys, Metallurgical and Materials Transactions A (Submitted in April 2012 and currently under review).

2. S. Kapoor, R. Liu, X.J. Wu, Effects of carbon and alloying elements on tribological behavior of Stellite alloys at elevated temperatures, *Journal of Engineering Materials and Technology* (Submitted in March 2012 and currently under review).

*Refereed Journal Publications:*

1. X.J. Wu, A.K. Koul and A.S. Krausz, "A Transgranular Fatigue Crack Growth Model Based on Restricted Slip Reversibility", *Metall. Trans. A*, 24A, (1993), p. 1373.
2. X.J. Wu, W. Wallace, M.D. Raizenne and A.K. Koul, "The Orientation Dependence of Fatigue Crack Growth in 8090 Al-Li Plate", *Metall. Trans. A*, 25A, (1994), 575.
3. X.J. Wu, W. Wallace, A.K. Koul and M.D. Raizenne, "Near-Threshold Fatigue Crack Growth in 8090 Al-Li Alloy", *Metall. Trans. A*, 26A, November, 1995.
4. X.J. Wu and A.K. Koul, "Grain boundary sliding at serrated grain boundaries", *Advanced Performance Materials*, in press, 1997.
5. X.J. Wu and W. Wallace, "On Low-Temperature Environment Assisted Fatigue Crack Propagation", *Metall. Trans. A*, 25A, (1994), p. 658.
6. X.J. Wu, "An Energy Approach to Crack Closure", *Int. J. Fracture*, vol. 73 (1995), pp.263-272.
7. X.J. Wu, "A New Approach to Fatigue Threshold" *Fatigue and Fracture of Engineering Materials and Structures*, vol. 18 (1995), 833-845.
8. X.J. Wu and A.K. Koul, "Grain Boundary Sliding in The Presence of Grain Boundary Precipitates", *Metall. Trans. A*, vol. 26A (1995), pp. 905-914.
9. X.J. Wu, A.K. Koul, L.Zao, "A new approach to heat damage evaluation for 7xxx aluminum alloy", *Canadian Aeronautics and Space Journal*, vol. 42 (1996), pp.93-101.
10. S.D. Mackie and X.J. Wu, "On the use of ultrasonic Contact Impedance for NDI of heat damaged 7050 aluminum alloy", *Canadian Aeronautics and Space Journal*, vol. 43 (1997), pp.25-27.
11. K. Krausz, X. J. Wu, Z. Lian and A.S. Krausz, "On the Constitutive Law of Environment Assisted Fatigue, Part I: The Physical Meaning of Paris Type Equations", *Z. Metallkd.*, 1992, vol. 83, pp. 283-288.
12. A.S. Krausz, X.J. Wu, Z. Lian and K. Krausz, "On the Constitutive Law of Environment Assisted Fatigue, Part II: The Physical Meaning of Paris Equation", *Z. Metallkd.*, 1992, vol. 83, pp. 356-363.
13. X.J. Wu and A.S. Krausz, "A Kinetics Formulation for Low Temperature Plastic Deformation", *J. Mater. Engineering & Performance*, vol. 3 (1994), pp. 169-177.
14. C.T. Liu, X.J. Wu and Y.Z. Li, "Study on Cracked Spherical Shells", *Scientia Sinica*, 1987, vol. 30A, pp. 944-954.
15. X.J. Wu and S. Cheng, "A Higher Order Theory for Plane-Stress Conditions of Laminates Consisting of Isotropic Layers," *J. Applied Mech.* Vol.66 (1999), p.95.
16. S. Cheng, X.J. Wu, W. Wallace and A.S.J. Swanidas, "Vibrational Response of a Beam with a Breathing Crack," *J. Sound & Vibration*, Vol. 225 (1999), p. 201.
17. S. Cheng, A.S.J. Swanidas, W. Wallace and X.J. Wu, "An Experimental Investigation of Tubular T-Joints Under Cyclic Loads," *J. Offshore Mech. & Arctic Eng.* Vol. 121 (1999), p. 137-143.

18. S. M. Cheng, A.S.J. Swamidas, W. Wallace and X.J. Wu, "Non-Destructive Detection of Cracks in Tubular T-Joints Using Vibration Characteristics", *Journal of Offshore Mechanics and Arctic Engineering*, Vol. 121, pp. 144-152, 1999.
19. S. Xu, X.J. Wu, A.K. Koul and J.I. Dickson, "An Intergranular Creep Crack Growth Model Based on Grain Boundary Sliding," *Met. Trans.* Vol. 30A (1999), p.1039.
20. X.J. Wu, W. Deng, A.K. Koul and J.-P. Immarigeon, "A continuously distributed dislocation model for fatigue crack in anisotropic crystalline materials" *Int. J Fatigue*, Vol. 23, S201-S206, 2001.
21. X.J. Wu, M.D. Raizenne, R.T. Holt, C. Poon and W. Wallace, "Thirty years of retrogression and reaging," *Canadian Aeronautics and Space Journal*, Vol. 47, 2001, pp. 131-138.
22. S.M. Cheng and X.J. Wu, "Finite element analysis of multiple asperity-to-asperity contacts", *International Journal of Computer Applications in Technology*, Vol. 15, No. 4/5, pp. 195-201, 2002.
23. Z.C. Ou and X.J. Wu, "On the crack tip stress singularity of interfacial cracks in transversely isotropic piezoelectric bimetals," *International Journal of Solids and Structures*, vol.40 (2003) 7499-7511.
24. M.R. Joyce, X. Wu and P.A.S. Reed, "The effect of environment and orientation on fatigue crack growth behavior of CMSX-4 nickel base single crystal at 650°C" *Materials letters* 58 (2003) 99-103.
25. Jun Zhao, Xijia Wu, Rong Liu, and Zhong Zhang . "Finite element analysis of a notch root semi-elliptical crack in single crystal superalloy". *Engineering Fracture Mechanics* Vol. 71 (2004), 1873-1890.
26. Rong Liu, Tie Zhang, X.J. Wu and C.H. Wang. "Effect of crack closure in a specially orthotropic cylindrical shell containing an axial or a circumferential crack". *Engineering Fracture Mechanics* 71 (2004), 1873-1890.
27. Rong Liu, Tie Zhang, X.J. Wu and C.H. Wang. "Crack closure effect on stress intensity factors of an axially and a circumferentially cracked cylindrical shell". *International Journal of Fracture* 125 (3-4) (2004), 227-248.
28. R. Liu, M. Yao and Xijia Wu. "Influence of Carbon Content in Cobalt-Based Superalloys on Mechanical and Wear Properties" *Journal of Materials Engineering and technology* 126 (2004), 204-212.
29. X.J. Wu, "A continuously distributed dislocation model of Zener-Stroh-Koehler cracks in anisotropic materials, *Int. J. Solids & Struct.* **42** (2005) 1909-1921.
30. Y. Ning, P.C. Patnaik, R. Liu, M.X. Yao, X.J. Wu "Effects of fabrication process and coating of reinforcements on the microstructure and wear performance of Stellite alloy composites," *Mater. Sci. Eng. A* **391** (2005) 313-324.
31. W.R. Chen, X. Wu, B.R. Marple, and P.C. Patnaik, "Influence of Heat Treatment on the Bond Coat Cyclic Oxidation Behaviour in an Air-plasma-sprayed Thermal Barrier Coating System", *Transactions of Materials and Heat Treatment*, Vol. **25**, No. 5 (2004).
32. R. Liu, T. Zhang, X. J. Wu and C. H. Wang, Determination of stress intensity factors for a cracked shell under bending with improved shell theories, *Journal of Aerospace Engineering* (2006), 21-28.

33. R. Liu, M. X. Yao, P. C. Patnaik, X. J. Wu (2005), Effects of heat treatment on mechanical and tribological properties of Laves intermetallic cobalt-based alloys, *Journal of Materials Engineering and Performance*, 14 (5), 634 -640.
34. R. Liu, T. Zhang, X. J. Wu and C. H. Wang (2005), Fracture mechanics of specially-orthotropic shells containing a crack, *The Quarterly Journal of Mechanics and Applied Mathematics*, 58 (3), 1 19.
35. R. Liu, W. Xu, M. X. Yao, P. C. Patnaik and X. J. Wu (2005), A newly developed Triballoy alloy with increased ductility, *Scripta Materialia*, 53 (12), 1351-1355.
36. W.R. Chen, X. Wu, D. Dudzinski, and P.C. Patnaik, 'Modification of oxide layer in plasma-sprayed thermal barrier coatings', *Surface and Coatings Technology*, online (2005).
37. W.R. Chen, X. Wu, B.R. Marple, and P.C. Patnaik, 'Oxidation and Crack Nucleation/Growth in an Air-Plasma-Sprayed Thermal Barrier Coating with NiCrAlY Bond Coat', *Surface and Coatings Technology* 197 (2005) 109-115.
38. W.R. Chen, X. Wu, B.R. Marple, and P.C. Patnaik, 'The growth and influence of thermally grown oxide in a thermal barrier coating' *Surface & Coatings Technology*, Vol. 201 (2006) 1074-1079.
39. Tavakoli, R. Liu and X. J. Wu, "Improved mechanical and tribological properties of tin-bronze journal bearing materials with newly developed Triballoy alloy additive", *Materials Science and Engineering A* 489 (2008) 389-402
40. J. Zhao, R. Liu and X. J. Wu, "Effects of partial crack-face contact for the bending of thin shell structures", *Theoretical and Applied Fracture Mechanics*, 49 (2008), 128-150.
41. P. Huang, R. Liu, X. J. Wu and M. X. Yao, "Effects of molybdenum content and heat treatment on mechanical and tribological properties of a low-carbon Stellite alloy", *Journal of Engineering Materials and Technology*, 129(4) (2007), 523-529.
42. P. Huang, R. Liu, X. J. Wu and M. X. Yao, "Mechanical properties and corrosion resistance of a novel Ni-Cr-Mo alloy", *Advanced Engineering Materials*, 9(1-2) (2007), 60-64.
43. W. Xu, R. Liu, P. C. Patnaik, M. X. Yao and X. J. Wu, Mechanical and tribological properties of newly developed Triballoy alloys, *Materials Science and Engineering A*, 452-453(2007), 427-436.
44. R. Liu, M. X. Yao, P. C. Patnaik and X. J. Wu, An improved wear-resistant PTA hardfacing - VWC/Stellite 21, *Journal of Composite Materials*, 40(24), (2006)2203-2215.
45. C. D. Opris, R. Liu, M. X. Yao and X. J. Wu, Development of Stellite alloy composites with sintering/HIPing technique for wear-resistant applications, *Materials & Design*, 28 (2007), 581-591.
46. R. Liu, M. X. Yao, P. C. Patnaik, X. J. Wu, Investigation of mechanical behavior of cobalt-based intermetallic materials using a nano-indentation technique, *Journal of Advanced Materials*, Special Edition No. 2 (2007), 65-75.
47. R. Liu, T. Zhang, X. J. Wu and C. H. Wang, Determination of stress intensity factors for a cracked shell under bending with improved shell theories, *Journal of Aerospace Engineering*, 19(1) (2006), 21-28.

48. P. Huang, R. Liu, X.J. Wu, M.X. Yao, Mechanical properties and corrosion resistance of a novel Ni-Cr-Mo alloy, *Advanced Engineering Materials*, 9(1-2), 2007, 60-64.
49. P. Huang, R. Liu, X.J. Wu, M.X. Yao, Effects of molybdenum content and heat treatment on mechanical and tribological properties of a low-carbon Stellite alloy, *Journal of Engineering Materials and Technology*, 129(4), 2007, 523-529.
50. X. Wu and P. Au, "Deformation Kinetics during Dwell Fatigue", *Materials Science and Technology*, Vol. 23 (2007), 1446-1449.
51. W. R. Chen, X. Wu, B.R. Marple, and D.R. Nagy, P. Patnaik (2008), TGO growth behaviour in TBCs with APS and HVOF bond coats, *Surface and Coating Technology* 202 (12), 2677-2683.
52. W. R. Chen, X. Wu, B.R. Marple, R.S. Lima, P.C. Patnaik (2008), Pre-oxidation and TGO growth behavior of an air-plasma sprayed thermal barrier coating, *Surface and Coating Technology* 202 (16), 3787-3796.
53. A. Khoddamzadeh, R. Liu and X. J. Wu (2008), Novel polytetrafluoroethylene (PTFE) composites with newly developed Tribaloy alloy additive for sliding bearings, *Wear* (In Press, Proofs available).
54. P. Buang, R. Liu, X. J. Wu and M. X. Yao (2008), Cracking analysis of HVOF coatings under Vickers indentation, *Journal of Coatings Technology and Research*, 5(4), 513-534.
55. A. Tavakoli, R. Liu and X. J. Wu (2008), Improved mechanical and tribological properties of tin-bronze journal bearing materials with newly developed Tribaloy alloy additive, *Materials Science and Engineering A*, 489, 389-402.
56. J. Zhao, R. Liu and X. J. Wu (2008), Effects of partial crack-face contact for the bending of thin shell structures, *Theoretical and Applied Fracture Mechanics*, 49, 128-150.
57. X. Wu, W. Beres, S. Yandt (2008), Challenges in Life Prediction of Gas Turbine Critical Components, *Can. Aeronaut. Space J.* 54 (2), 31-39.
58. X. Wu (2009), A model of nonlinear fatigue-creep(dwell) interaction, *J. Eng. Gas Turbines and Power*, Vol. 131, 032101.
59. F. Gao, R. Liu, X.J. Wu, Tribological behavior of T-401/tin-bronze composite coating deposited by HVOF on the bushing of planet journals, *Wear* 269 (2010) 724-732.
60. R. Liu • S. Q. Xi • S. Kapoor • X. J. Wu, Investigation of solidification behavior and associate microstructures of Co-Cr-W and Co-Cr-Mo alloy systems using DSC technique, *J Mater Sci* (2010) 45:6225-6234.
61. F. Gao, R. Liu, X.J. Wu, Tribaloy alloy reinforced tin-bronze composite coating for journal bearing applications, *Thin Solid Films*, 519, 2011, 4809-4817.
62. R. Liu, X.S. Qi, S. Kapoor, X.J. Wu, Effects of chemical composition on solidification, microstructure and hardness of Co-Cr-W-Ni and Co-Cr-Mo-Ni alloy systems, *International Journal of Research and Reviews in Applied Sciences*, 5(2), 2010, 110-122.
63. N.V. Demidova, X.J. Wu, R. Liu, A fracture toughness model for brittle coating on ductile substrate under indentation loading, *Engineering Fracture Mechanics* 82 (2012) 17-28.

64. Xijia Wu, Steve Williams, and Diguang Gong, A True-Stress Creep Model Based on Deformation Mechanisms for Polycrystalline Materials, *Journal of Materials Engineering and Performance*, online, 2012, <http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s11665-012-0191-6>

(b) Articles in Conference Proceedings:

1. X.J. Wu, W. Wallace, A.K. Koul and M.D. Raizenne, "The Orientation Dependence of Fatigue Crack Growth in 8090 Al-Li Plate", *Fatigue'93*, Montreal, Quebec, May, 1993.
2. X.J. Wu, A.K. Koul and W. Wallace, "The Influence of Microstructure on Moist-Air Fatigue Crack Growth in 8090 Al-Li alloy", 4-th Int. Conf. on Aluminum Alloys, Atlanta, GA, September 11-16, 1994.
3. X.J. Wu, A.S. Krausz and K. Krausz, "Kinetics of Cross-Over Behaviour in Stress Corrosion Cracking", 3rd Intl SAMPE Metals and Metals Processing Conf., Toronto, Ontario, October 1992.
4. X.J. Wu and A.K. Koul, (invited) "An overview of creep deformation mechanisms and modelling," *Materials Week 96*, Cincinnati, OH, October, 1996.
5. X.J. Wu, A.K. Koul, L.Zao, "A new approach to the evaluation of heat damage in 7xxx aluminum alloys", 9th Canadian Symposium on Aerospace Structures and Materials, Ottawa, April, 1996.
6. X.J. Wu, A.K. Koul, "Predicting the evolution of heat damage in 7050 aluminum alloy", CIM/COM session "Materials Problems in Aging Aircraft," August, 1996, Montreal, QC.
7. X.J. Wu, W. Deng, A.K. Koul and J.-P. Immarigeon, "A continuously distributed dislocation model for fatigue crack in anisotropic crystalline materials" *Int. Conf. Fatigue Damage of Structural Materials*, September 17-22, 2000, Hyannis, MA.
8. M.D. Raizenne, X.J. Wu, M. Whitehouse, and C. Poon, "Retrospection and Reaging of A C-130 7075-T6511 Sloping Longeron," *ASIP 2000*, San Antonio, TX, December 5-8, 2000.
9. X.J. Wu, S. Yandt, P. Au and J-P. Immarigeon, "Modeling Thermomechanical Fatigue by Evolution of Its Activation Energy", *ASTM 1248*, pp. 3-14, American Society for Testing and Materials, 2001
10. X.J. Wu, J.-P. Immarigeon, W. Wallace, "Material Modeling for Optimized Material Performance and Life Prediction—An Overview" 4th Pacific International Conference on Aerospace Science and Technology, May 1-4, 2001
11. X.J. Wu, W.R. Chen, and B.R. Marple, "Assessment of the APS-TBC Microstructure at Critical Failure," *High Temperature Fatigue CAMP 2002*, April 3-4, Paderborn, Germany, pp.239-247.
12. X.J. Wu, Z. Zhang, and C. Poon, "The Effective Stress Intensity Factor of Notched Fiber-Metal Laminate based on A Higher-Order Theory," 9th International Conference on Composite Engineering, July 1-6, 2002, San Diego, CA.
13. Q. Yang, X.J. Wu, W.R. Chen, and P.C. Patnaik. "Characterization of Thermal Barrier Coating by Nano-Indentation," *Symposium on Thermal Spray Coating*, September 29-31, 2002, Niagara Fall, ON.

14. W.R. Chen, X.J. Wu, J.-P. Immarigeon, and P.C. Patnaik. "Oxidation Behavior of a Plasma-Sprayed TBC system," The 13th Congress of the International Federation for Heat Treatment and Surface Engineering (IFHTSE) and ASM International Surface Engineering Congress, Oct. 7 - 10, 2002, Columbus, Ohio.
15. X.J. Wu, "Software Predicting Precipitation Kinetics and Properties of 7075 Aluminum Alloy," AeroMat Conference and Exposition, June 10-13, 2002, Orlando, FL.
16. X.J. Wu, "A Higher Order Theory For Fiber-Metal Laminates," International Conference on Aeronautical Sciences, September 8-13, 2002, Toronto, ON.
17. X.J. Wu, M.D. Raizenne, C. Poon, W. Chen, W. Wallace, "Thirty Years of Retrogression and Reaging," International Conference on Aeronautical Sciences, September 8-13, 2002, Toronto, ON.
18. W. Wallace, X.J. Wu, and M.D. Raizenne, (invited) "Old Problems - New Solutions, The Metallurgy of the 7000 Series Aluminum Alloys," 14th Canadian Materials Science Conference, June 8-11, Winnipeg, MB.
19. X.J. Wu, W.R. Chen, and M.D. Raizenne, "On retrogression and reaging of 7xxx aluminum alloys," 16th Aerospace Structures and Materials Symposium, April 28-30, 2003, Montreal, Quebec.
20. J. Zhao, X.J. Wu, Z. Zhang, and R. Liu, Investigation of Elastic-Plastic J-Integral of a 3D Semi-elliptical Crack at the Notch Root of an Anisotropic Bar with Finite Element Method, 15th Canadian Materials Science Conference, Halifax, Nova Scotia, June 7-10, 2003.
21. X.J. Wu, P.C. Patnaik, M. Liao, and W.R. Chen. A Statistical Assessment of The Damage State in Plasma-Sprayed Thermal Barrier Coating, ASTM TURBO-EXPO Technical Congress, June 16-19, 2003, Atlanta, GA.
22. Xijia Wu, Weijie Chen, Min Liao, and Prakash Patnaik. Microstructural Damage Evolution in Plasma Sprayed Thermal Barrier Coatings. International Conference on Thermal and Environmental Coatings, August 19-23, 2003, Irsee, Germany.
23. X. Wu, P.A.S. Reed, M. Miller, "Fracture Mechanics Analysis of Notch Fatigue of a Single Crystal Superalloy CMSX-4" – CPR-SMPL-2004-0075 (International Conference of Fracture 2005)
24. Y. Ning, P.C. Patnaik, R. Liu, M.X. Yao, X.J. Wu, "Microstructure and Performance of Stellite Alloy Composites Reinforced with Ni-Coated TiC Particles", Aerospace Materials and Manufacturing: Development, Testing, and Life Cycle Issues, Proc. 43rd Conf. Of Metallurgists of CIM, Aug 22-25, 2004, Hamilton, ON.
25. C.D. Opris, R. Liu, M.X. Yao, X. J., Wu, P.C. Patnaik, "Wear-resistant TiC-reinforced Stellite Alloy Composites" Aerospace Materials and Manufacturing: Development, Testing, and Life Cycle Issues, Proc. 43rd Conf. Of Metallurgists of CIM, Aug 22-25, 2004, Hamilton, ON.
26. X.J. Wu, P.C. Patnaik, J. Bird, "Advanced Prognosis of Life Cycle Management of Future and Legacy Aircraft Propulsion Systems –A Canadian Perspective," Aerospace Materials and Manufacturing: Development, Testing, and Life Cycle Issues, Proc. 43rd Conf. Of Metallurgists of CIM, Aug 22-25, 2004, Hamilton, ON.

27. X.J. Wu, W.R. Chen, and P.C. Patnaik. The growth and influence of thermally grown oxide in a thermal barrier coating, International Thermal Spray Conference, May 14-17, 2007, Beijing, China.
28. Xijia Wu, Jeff Bird, Prakash Patnaik. A Framework of Prognosis and Health Management- The NRC Approach, ASME TURBO EXPO 2007, May 14-17, Montreal, QC.
29. Xijia Wu, and Peter Au. Deformation Kinetics During Dwell Fatigue, Conference on High Temperature Fatigue, December 4-7, 2006, London, UK.
30. Fahr, A., Mandache, C., Genest, M., Chen, W., and Wu, X., "Evaluation of Plasma Sprayed Thermal Barrier Coatings using NDE and SEM", ASME TURBO EXPO 2007, May 14-17, Montreal, QC.
31. X. Wu, A nonlinear model of dwell/creep-fatigue interaction, Proceedings of ASME Turbo Expo 2008 (GT2008-51527), June 9-13, 2008, Berlin, Germany.
32. Z. Zhang, X. Wu, , and W. Beres, A Finite Element Model to Simulate Mechanical and Thermal Contact Between Blade and Seal, 47th Conference of Metallurgists, August 24-27, 2008, Winnipeg, Manitoba.
33. X. Wu, Z. Zhang, S. Yandt, "An integrated creep-fatigue modelling framework" ASME Turbo Expo 2009 (GT2009-59087), June 8-12, 2009, Orlando, FL.
34. X. Wu, "A physics based understanding of the hold time effects on fatigue" (keynote lecture), 12th International Conference on Fracture, July 12-18, 2009, Ottawa, Ontario.
35. Wu, X.; Beres, W.; Zhang, Z.; Reed, P.A.S., Fracture Mechanics Analysis of a Single Crystal Turbine Blade Using the J-Integral Concept, ASME Turbo Expo 2010 (GT2010-22355), June 14-18, 2010, Glasgow, UK.
36. Merati, A.; Beres, W.; Wu, X.. Effect of foreign object damage (FOD) on fatigue performance of fan blade Ti-6Al-4V material, Canadian Forces-DRDC International Defence Applications of Materials Meeting, Halifax, NS, June 7-8, 2011.
37. W. R. Chen, X. Wu, E. Irissou, J-G. Legoux, and B. R. Marple, The Influence of Spray Processes for CoNiCrAlY Bond Coat on the Oxidation Behaviour of TBCs, presented at New Perspectives on Cold Spray Development and Laser Cladding Review, 33rd Semi-Annual SURFTEC Meeting, December 7, 2011.
38. W.R. Chen, D.C. Dudzinski, L. Zhao, W. Beres, X. Wu, R. Kearsey, J. Tsang, and P. Au, Metallurgical and Mechanical Investigation of a Service Exposed Iron-Nickel-Base Alloy, presented at 2011 CF/DRDC International Defence Applications of Materials Meeting, Halifax, Canada, June 7-9, 2011.
39. S. Kapoor, R. Liu, X.J. Wu, M.X. Yao, Temperature-dependence of hardness and wear resistance of Stellite alloys, Proceedings of 2012 International Conference on Aerospace, Mechanical, Automotive and Materials Engineering (ICAMAME 2012), Paris, France, 2012.
40. J. Zhao, R. Liu, X.J. Wu, An improved shell theory applied for failure analysis of pressure vessels, Proceedings of ASME 2011 Pressure Vessels and Piping Conference (PVP2011), Baltimore, USA, 2011.
41. F. Gao, R. Liu, X.J. Wu, Triballoy alloy reinforced tin-bronze composite coating for journal bearing applications, Proceedings of The 5th International Conference on Technological Advances of Thin Films & Surface Coatings (ThinFilms2010) and

The 1st international Conference on Advanced polymer and polymer composites (COMPO2010), Harbin, China, 2010.

42. A. Tavakoli, R. Liu, X.J. Wu, Novel bronze-based T-401 Tribaloy composite for journal bearing components, Proceedings of the 17th International Conference on Composite Engineering (ICCE/17), Hawaii, USA, 2009.
43. N.V. Demidova, X.J. Wu, R. Liu, Fracture mechanics analysis of radial/median crack systems in brittle coatings on ductile substrates under sharp contact, Proceedings of the 12th International Conference on Fracture (ICF12), Ottawa, Canada, 2009.
44. J. Zhao, R. Liu, T. Zhang, X.J. Wu, Crack closure effect in a cracked cylinder under pressure, Proceedings of the 16th European Conference of Fracture (ECF16), Alexandroupolis, Greece, 2006.
45. C.D. Opris, R. Liu, M.X. Yao, X.J. Wu, P.C. Prakash, Wear-resistant TiC-reinforced Stellite alloy composites, Proceedings of 43rd Conference of Metallurgists (COM), Hamilton, Canada, 2004.
46. C.D. Opris, R. Liu, M.X. Yao, X.J. Wu, Development of TiC-reinforced Stellite alloy composites with sintering/HIPing technique for wear-resistance application, Proceedings of 16<sup>th</sup> Canadian Materials Science Conference (CMSC), Ottawa, Canada, 2004.
47. J. Zhao, X.J. Wu, R. Liu, Z. Zhang, Investigation of semi-elliptical crack behavior at a notch-root in single crystal superalloy, Proceedings of 16<sup>th</sup> Canadian Materials Science Conference (CMSC), Ottawa, Canada, 2004.
48. R. Liu, M.X. Yao, X.J. Wu, Influence of carbon content in cobalt-based superalloys on mechanical and wear properties”, Proceedings of 15<sup>th</sup> Canadian Materials Science Conference (CMSC), Halifax, Canada, 2003.

(c) Chapters in published books:

1. Life Prediction of Gas Turbine Materials, in Gas Turbines, edited by I. Gurrappa, Sciyo, 2010. [www.sciyo.com](http://www.sciyo.com)

(d) Patent:

1. Method and System for Prediction of Precipitation Kinetics in Precipitation-Hardenable Aluminum Alloys, US patent number. 6,925,352. Aug 2, 2005.

## **G. RESEARCH AWARDS**

The Technical Cooperation Program Award (US, UK, Canada, Australia, New Zealand), 2005.

NRC Award-Industrial Collaboration, 1999.

NRC-IAR Award-Technical Innovation and Partnership with Industry, 2001

## **H. PROFESSIONAL CONTRIBUTION**

### Keynote Speaker

“Modeling creep in complex engineering alloy”. Symposium of Creep and Stress Relaxation in Miniature Structures and Components, Cincinnati, OH, Nov. 1996

“Physics-based modeling of hold-time effects on fatigue”. 12th International Conference on Fracture, Ottawa, ON. 2009.

### Conference/Sessions Organized

Engine Health Monitoring and Residual Life Assessment at ASME TURBO EXPO 2009, Orlando, Florida;

1) Hot Section Life Extension Strategies, and 2) Rotor Life extension Issues versus OEM Derivatives. Gas Turbine Users Symposium, Huston, TX, 2010.

### Journal Reviewer

Metallurgical and Materials Transactions

International Journal of Fatigue

Engineering Fracture Mechanics

### Profession Association

Chair of ASM-Ottawa Chapter (2005-2006)

ASM Materials Genome Team (2012)