

Fei Shen

Personal Information

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Date of Birth: Nov. 10, 1986

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Education

- **Ph.D. in Solid Mechanics** 9/2009 ~ 12/2015
School of Aeronautic Science and Engineering, Beihang University, Beijing, China
- **B.E. in Aerospace Engineering** 9/2005 ~ 7/2009
School of Astronautics, Beihang University, Beijing, China
Top 9/93 Postgraduate recommendation

Research Interests

- **3D printing**
 - Process modeling of selective laser sintering
 - Mechanical and thermal behavior of polymeric materials
 - Energy absorption of 3D printed light-weight structures under quasi-static compression and impact
- **Fretting fatigue and wear**
 - Fretting fatigue crack initiation behavior
 - Numerical simulation of wear
 - Finite element simulation of fretting fatigue life prediction
 - Effect of stress gradient on fretting fatigue life
- **Continuum damage mechanics and its applications in multi-axial fatigue and fretting fatigue**
 - Fatigue damage evolution model
 - Damage coupled constitutive model of metallic material
 - Numerical algorithm of fatigue life prediction using continuum damage mechanics approach
- **Computational mechanics**
 - Constitutive model of cyclic plastic deformation for typical metallic materials
 - Finite element implementation of inelastic constitutive model

Research Experience

- **Simulation of mechanical behavior of printed structures** 3/2016 ~ present
Research Fellow at Nanyang Technological University (NTU), Singapore
 - Modeling of selective laser sintering processes
 - Development of thermal and mechanical constitutive model of polymeric materials

- Experimental and numerical investigation on the energy absorption of 3D printed light-weight structures under quasi-static compression and impact
- **Fretting fatigue crack initiation behavior using damage mechanics approach** 6/2012 ~ 10/2015
Sponsor: National Natural Science Foundation of China (Grant number: 11002010)
 - Finite element simulation of fretting contact
 - Study of the effect of wear on stress and fretting fatigue life
 - Fretting fatigue life prediction by combining the damage coupled elastic-plastic constitutive model, damage evolution model and wear model
 - Finite element implementation of the approach using user subroutines in ABAQUS
 - Analysis of the effect of stress gradient on fretting fatigue life
- **Fatigue life prediction of notched specimen** 8/2013 ~ 12/2014
 - Stress strain response at the notch tip using damage coupled elastic-plastic constitutive model
 - Fatigue damage accumulation by adopting two kinds of damage evolution model
 - Finite element implementation of fatigue life prediction
- **Statics and dynamics simulation of satellite components** 6/2013 ~ 9/2013
 - Simplify the finite element model of satellite components
 - Statics and dynamics simulation including under the shock and random vibration in ANSYS
- **Fatigue life prediction of riveted lap joint in aircraft structures** 8/2011 ~ 6/2012
 - Simulation of stress at the hole edge
 - Fatigue damage evolution model and parameters identification
 - Numerical algorithm of fatigue life prediction using APDL in ANSYS
- **Analysis on the wire support system in the wind tunnel** 2/2011 ~ 6/2011
 - Modeling of wire support system based on the principle of force equilibrium and calculate the pre-tightening force of each wire
 - Validation of the results by finite element simulation in ANSYS
- **Numerical simulation on the suspension bridge** 10/2010 ~ 12/2010
 - Finite element modeling of the suspension bridge in ANSYS and determine the pre-strain of cables
 - Modal analysis of the suspension bridge to calculate the resonant frequency

Academic qualification

- Five years' experience in the integrated study of continuum damage mechanics, fatigue theory, fretting fatigue and wear
- Expertise in damage mechanics approach and multi-axial fatigue criteria for fatigue life prediction of metallic materials
- Expertise in Finite Element Analysis and the finite element software packages ABAQUS, ANSYS
- Excel at the constitutive models of cyclic plasticity and the finite element implementation in ABAQUS
- Excel at C/C++, Fortran, MATLAB and Python

Publications

Journal Articles

1. **Fei Shen**, Weiping Hu, Qingchun Meng. A damage mechanics approach to fretting fatigue life prediction with consideration of elastic-plastic damage model and wear, *Tribology International*, 82, 176-190, 2015.

2. **Fei Shen**, Weiping Hu, George Z. Voyiadjis, Qingchun Meng. Effects of fatigue damage and wear on fretting fatigue under partial slip condition. *Wear*, 338-339, 394-405, 2015.
3. **Fei Shen**, George Z. Voyiadjis, Weiping Hu, Qingchun Meng. Analysis on the fatigue damage evolution of notched specimens with consideration of cyclic plasticity. *Fatigue and Fracture of Engineering Materials and Structures*, 38, 1194-1208, 2015.
4. **Fei Shen**, Weiping Hu, Qingchun Meng. New approach based on continuum damage mechanics with simple parameters identification to fretting fatigue life prediction. *Applied Mathematics and Mechanics*, 36(12), 1539-1554, 2015.
5. **Fei Shen**, Weiping Hu, Qingchun Meng, Miao Zhang. A new damage mechanics based approach to fatigue life prediction and its engineering application. *Acta Mechanica Solida Sinica*, 28(5), 510-520, 2015.
6. **Fei Shen**, Weiping Hu, Qingchun Meng. A non-local approach based on the hypothesis of damage dissipation potential equivalence to the effect of stress gradient in fretting fatigue. *International Journal of Fatigue*, 90, 125-138, 2016.
7. **Fei Shen**, Shangqin Yuan, Yanchunni Guo, Bo Zhao, Jiaming Bai, Mahan Qwamizadeh, Chee Kai Chua, Jun Wei, Kun Zhou. Energy Absorption of Thermoplastic Polyurethane Lattice Structures via 3D Printing: Modeling and Prediction. *International Journal of Applied Mechanics*. 8(7), 164006-1, 2016.
8. **Fei Shen**, Bo Zhao, Lin Li, Chee Kai Chua, Kun Zhou. Fatigue damage evolution and lifetime prediction of welded joints with the consideration of residual stresses and porosity. *International Journal of Fatigue*, 103, 272-279, 2017.
9. **Fei Shen**, Shangqin Yuan, Chee Kai Chua, Kun Zhou. Development of process efficiency maps for selective laser sintering of polymeric composite powders: Modeling and experimental testing. *Journal of Materials Processing Technology* 254, 52-59, 2018.
10. Pamela Lin, **Fei Shen**, Alfred Yeo, Bo Liu, Ming Xue, Huan Xu, Kun Zhou. Characterization of interfacial delamination in multi-layered integrated circuit packaging. *Surface and Coatings Technology*. 2016.
11. Shangqin Yuan, **Fei Shen**, Jiaming Bai, Chee Kai Chua, Jun Wei, Kun Zhou. 3D soft auxetic lattice structures fabricated by selective laser sintering: TPU powder evaluation and process optimization. *Materials & Design*, 120, 317-327, 2017.
12. Bo Zhao, **Fei Shen**, Yi Cui, Kun Zhou. Damage analysis for an elastic-plastic body in cylindrical contact with a rigid plane. *Tribology International*, 115, 18-27, 2017.
13. Ying Sun, Weiping Hu, **Fei Shen**, Qingchun Meng, Yuanming Xu. Numerical simulations of the fatigue damage evolution at a fastener hole treated by cold expansion or with interference fit pin. *International Journal of Mechanical Sciences*, 107, 188-200, 2016.
14. Zhixin Zhan, Weiping Hu, **Fei Shen**, Qingchun Meng, Jing Pu, Zhidong Guan. Fatigue life calculation for a specimen with an impact pit considering impact damage, residual stress relaxation and elastic-plastic fatigue damage. *International Journal of Fatigue*, 96, 208-223, 2017.
15. Ying Sun, George Z. Voyiadjis, Weiping Hu, **Fei Shen**, Qingchun Meng. Fatigue and fretting fatigue life prediction of double-lap bolted joints using continuum damage mechanics-based approach. *International Journal of Damage Mechanics*, 26(1), 162-168, 2016.
16. Jiaming Bai, Shangqin Yuan, **Fei Shen**, Baicheng Zhang, Chee Kai Chua , Kun Zhou, Jun Wei. Toughening of polyamide 11 with carbon nanotubes for additive manufacturing. *Virtual and Physical Prototyping*, 12(3), 235-240, 2017.

17. Ping Hu, Qingchun Meng, Weiping Hu, **Fei Shen**, Zhixin Zhan, Linlin Sun. A continuum damage mechanics approach coupled with an improved pit evolution model for the corrosion fatigue of aluminum alloy. *Corrosion Science*, 113, 78-90, 2016.
18. Zhixin Zhan, Qingchun Meng, Weiping Hu, Ying Sun, **Fei Shen**, Yanjun Zhang. Continuum damage mechanics based approach to study the effects of the scarf angle, surface friction and clamping force over the fatigue life of scarf bolted joints. *International Journal of Fatigue*, 102, 59-78, 2017.

Conference Paper

1. **Fei Shen**, Miao Zhang, Weiping Hu, Qingchun Meng. Finite element analysis of large span suspension bridge. *Proceedings of the fourth international conference on modelling and simulation*, Phuket, Thailand, April 25-27, 2011.

Journal Paper Reviews

International Journal of Damage Mechanics

Fatigue and Fracture of Engineering Materials and Structures

Mechanics Research Communications