

DR. YILUN XU

Postdoctoral Research Associate, Teaching Fellow

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QUALIFICATIONS

Ph.D. in Tribology & Mechanics of Materials, Imperial College London January 2016

Thesis: On the Development of a Multi-scale Modelling Framework to Study Plasticity and Damage through the Coupling of Finite Element Crystal Plasticity and Discrete Dislocation Plasticity

M.Sc. in Advanced Mechanical Engineering, Imperial College London September 2011

Dissertation: Multi-Scale Modeling of Polycrystalline Materials Using a Combined Finite Element and Dislocation Dynamics Approach

Graduation with Distinction; A in all courses and research project

M.Eng. in Mechanical Design, Northeastern University March 2013

Graduation with Distinction and GPA: 91%

B.Eng. in Mechanical Engineering, Northeastern University July 2009

Graduation with Distinction and GPA ranked 3rd / 390

RESEARCH EMPLOYMENT

Postdoctoral Research Associate October 2015 - Present

Imperial College London, London, UK

- Working in Department of Materials and Department of Mechanical Engineering
- Participated in an EPSPR research project focusing on solder joint modelling using Crystal Plasticity Finite Element (CPFE) method
- Participated in an EPSPR research project focusing on titanium alloys modelling using Discrete Dislocation Plasticity (DDP) method
- Participated in an EPSRC research project focusing on multi-scale tribology simulations
- Co-supervised research projects of 4 PhD., more than 15 MSc and MEng students

Marie Currie Experienced Researcher October 2015 - October 2016

SKF B.V., Utrecht, Netherlands

- Pioneeringly developed a numerical model for simulating the crack behavior under rolling contact conditions using Extended Finite Element Method (XFEM) and Abaqus subroutines
- Completed 1 comprehensive technical report for the aforementioned research
- Established connections and knowledge exchange between ERC SKF and Imperial College London

Research Assistant June 2007 - October 2010

State Key Laboratory of Integrated Automation of Process Industry, Shenyang, China

- Led the mesh module development of a software for thermal-solid coupling
- Coordinated the project plan with internal colleagues
- Collaborated with external colleagues working on other modules

GRANTS AND AWARDS

Top 10 Young Researcher of European Mechanics Society	June 2018
Thomas Andrew Prize X2 (£3K)	2015 2018
CAGB travel grants (£1K)	2014
Imperial College London travel grants X2 (£2K)	2013
Overseas Student Exception Scholarship (£60K)	November 2011

TEACHING AND SUPERVISION

Imperial College London, London, UK November 2011 - Present
Course Leader, Teaching Assistant and Co-supervisor

- Elected as Fellow of Higher Education Academy (FHEA)
- Studied and designed innovative interactive pedagogical methods across syllabus
- Leading the numeral modelling course in Material Science and Engineering
- Designed FEA module of Mechanical Transmission Technology, lectured to 52 postgraduate students
- Acted as tutorial teacher in courses of Computing (MATLAB), CAD (Solidworks), Solid Mechanics, Stress Analysis and Finite Element Analysis & Application to more than 50 undergraduate students
- Demonstrated metal microstructure effect and turbulence measurement as laboratory demonstrator and teaching assistant for 20 undergraduate students
- Co-supervised and managed 4 PhD, 12 MSc and MEng students for their research projects. All mater students have successfully obtained their degree.

JOURNAL PAPERS

- Y. Xu*, S. Joseph, P. Karamched, K. Fox, F. Dunne*, D.Dye, "Predicting Dwell Fatigue Life in Titanium Alloys: Modelling and Experiment," *Nature Communications* [Q1], Nov 2020
- Y. Xu*, "A non-local methodology for geometrically necessary dislocations and application to crack tips," *International Journal of Plasticity* [Q1], Mar 2021
- F. Ruebeling, Y. Xu*, G. Richter, P. Gumbsch, D. Dini, C. Greiner*, "Normal load and counter body size influence the initiation of microstructural discontinuities in copper during sliding," *ACS Applied Materials and Interfaces* [Q1], Jan 2021
- Y. Xu*, F. Ruebeling, G. Richter, P. Gumbsch, D. Balint, D. Dini, C. Greiner, "On the origin of microstructural discontinuities in sliding contacts: a discrete dislocation plasticity analysis," *International Journal of Plasticity* [Q1], Jan 2021
- Y. Xu*, T. Gu, J. Xian, C. Gourley, B. Britton, F. Dunne, "Intermetallic size and morphology effects on creep rate of Sn-3Ag-0.5Cu solder," *International Journal of Plasticity* [Q1], Jan 2020
- Y. Xu*, K. Fox, D. Rugg, F. Dunne, "Cyclic plasticity and thermomechanical alleviation in titanium alloys," *International Journal of Plasticity* [Q1], Apr 2020
- N. Prastiti*, Y. Xu, D. Balint, F. Dunne, "Discrete dislocation, crystal plasticity and experimental studies of fatigue crack nucleation in single-crystal nickel," *International Journal of Plasticity* [Q1], Oct 2019
- Y. Xu, W. Wan*, F. Dunne, "Microstructural fracture mechanics: stored energy density at fatigue cracks," *Journal of the Mechanics and Physics of Solids* [Q1], Oct 2020
- X. Lu, F. Dunne, Y. Xu*, "A crystal plasticity investigation of slip system interaction, GND density and stored energy in non-proportional fatigue in Nickel-based superalloy," *International Journal of Fatigue* [Q1], Jun 2020
- Y. Xu, D. Dini*, "Capturing the Hardness of Coating Systems Across the Scales," *Surface and Coatings Technology* [Q1], Apr 2020

- K. Li, L. Cheng, Y. Xu, R. Wang, Y. Zhang, X. Zhang*, S. Tu, H. Miura “A dual-scale modelling approach for creep-fatigue crack initiation life prediction of holed structure in a nickel-based superalloy,” *International Journal of Fatigue* [Q1], Jan 2022
- Y. Xu, D. Balint, D. Dini, “On the origin of plastic deformation and surface evolution in nano-fretting: a discrete dislocation plasticity analysis,” *Materials*, Accepted
- T. Gu*, Y. Xu, C. Gourley, B. Britton “In-situ electron backscatter diffraction of thermal cycling in a single grain Cu/Sn-3Ag-0.5Cu/Cu solder joint,” *Scripta Materialia* [Q1], Oct 2019
- Y. Xu, D. Dini*, D. Balint, “A New Hardness Formula Incorporating the Effect of Source Density on Indentation Response: A Discrete Dislocation Plasticity Analysis,” *Surface and Coatings Technology* [Q1], Jan 2019
- Y. Xu, D. Balint, and D. Dini, “A General Approach to Study Plasticity by Coupling the Crystal Plasticity Finite Element Method and Dislocation Dynamics” *Modelling and Simulation in Materials Science and Engineering* [Q2], Jan 2016
- WANG Cheng-en, CUI Dong-liang, YAN Zhi-yuan, XU Yi-lun*, “Finite element triangle mesh generation in planar area ,” *Computer Integrated Manufacturing Systems*, Nov 2011
- B. Kunzelmann, Y. Xu, Pawel Rycerz, B. Nagaraj, A. Kadiric, “Prediction of Rolling Contact Fatigue Crack Propagation Using Linear Elastic Fracture Mechanics,” *International Journal of Fatigue*, Under Review
- A. Bergsmo, Y. Xu*, F. Dunne, “Twin boundary fatigue crack nucleation in a polycrystalline Nickel superalloy containing non-metallic inclusions,” *Journal of the Mechanics and Physics of Solids*, Under Review
- Y. Xu, T. Gu, C. Gourley, B. Britton, F. Dunne, “Extracting intrinsic beta-Sn slip properties and rate sensitivity from micro-pillar tests,” *Journal of the Mechanics and Physics of Solids*, In Draft
- Y. Xu, D. Dini, “On the Origin of Surface and Sub-surface Plasticity in Sliding Contacts,” *International Journal of Plasticity*, Under Review

CONFERENCE PAPERS

- Y. Xu, T. Gu, J. Xian, C. Gourlay, F. Giuliani, B. Britton and F. Dunne “ β -Sn material properties extraction and application on understanding creep rate of SAC samples ,” *Proceedings of TMS 2020*, San Diego, USA, Feb 2020
- Y. Xu, F. Dunne “Discrete Dislocation Plasticity Modelling of Negative Creep in Titanium Alloys ,” *9th Postdoc Symposium*, London, UK, Dec 2019
- Y. Xu, K. Fox, D. Rugg, F. Dunne “Negative Creep Behaviour and Thermomechanical Alleviation in Titanium Alloys under Cyclic Loading ,” *Proceedings of Materials Research Society MRS 2019 Fall*, Boston, USA, Dec 2019
- Y. Xu, D. Dini, D. Balint “Microstructure Change under Frictional Slide A Discrete Dislocation Analysis ,” *Proceedings of Materials Science and Engineering Congress 2018*, Darmstadt, Germany, Sep 2018
- Y. Xu, D. Dini, D. Balint “Subsurface Dislocation Activities under Frictional Slide A Discrete Dislocation Analysis ,” *Proceedings of 10th European Solid Mechanics Conference*, Bologna, Italy, Jul 2018
- Y. Xu, D. Dini, D. Balint “Single Asperity Sliding: A Multi-scale Coupling Analysis between Discrete Dislocation Plasticity and a Crystal Plasticity Finite Element,” *Proceedings of 6th World Tribology Congress*, Beijing, China, Sep 2017

Y. Xu, A.Kadicic, “Surface Behavior for Penny Shape Surface break Crack under Various Rolling Conditions,” *Proceedings of iBetter Conference*, Utrecht, Netherlands, Apr 2017

Y. Xu, D.Dini and D.Balint, “Source Density Effect on Indentation Pressure Response of Thin Films: A Discrete Dislocation Plasticity Analysis,” *Proceedings of European Congress on Computational Methods in Applied Sciences and Engineering*, Crete, Greece, Jun 2016

Y. Xu, A.Kadicic, “ Determination of Stress Intensity Factors for Penny Shape Surface-break Crack under Rolling Contact: An XFEM Study,” *Proceedings of 10th TriboUK*, Leeds, UK, Apr 2016

Y. Xu, D.Dini, D.Balint, “ Size Effects in Single Asperity Fretting: A Discrete Dislocation Dynamics Analysis,” *Proceedings of 7th International Tribology Conference*, Tokyo, Japan Sep 2015

Y. Xu, D.Dini, D.Balint, “Multi-scale Modeling of Indentation and Contact Fatigue: A Coupled CPFE/DD Approach,” *Proceedings of 5th World Tribology Congress*, Turin, Italy Sep 2013

Y. Xu, D.Dini, D.Balint, “Multiscale Modelling of Polycrystalline Materials Using a Combined Finite Element Dislocation Dynamics Approach,” *Proceedings of 9th TriboUK* , Southampton, UK Sep 2012

TECHNICAL SKILLS

Programming Languages	Python, Batch, Bash, Fortran, C/C++, MATLAB
Professional Software	Abaqus, ANSYS, Adams, SolidWorks, AutoCAD, LabView
Working Tools	HTML, CSS, L ^A T _E X, Office, Tecplot, Camtasia