

# Mu'tasem Shehadeh

Department of Mechanical Engineering  
American University of Beirut  
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## EDUCATION

- PhD** Mechanical Engineering (May 2005)  
Washington State University, Pullman, WA.  
**\*Advisor: Prof. Hussein. M. Zbib**  
**\*Research topics: Computational mechanics, Multi-scale modeling of metals, Shockwave- induced plasticity, Dislocation dynamics**
- MS** Mechanical Engineering (June 2000)  
University of Jordan, Amman, Jordan.  
**Research topics: Nonlinear vibration and stability analysis**
- BS** Mechanical Engineering (June 1998)  
University of Jordan, Amman, Jordan.

## PROFESSIONAL EXPERIENCE

- Assistant Professor** Sep 2008–present  
Department of Mechanical Engineering  
American University of Beirut, Lebanon  
Teaching: **Mechanical Design, Mechanics of Materials, Elasticity and Plasticity, Crystal Plasticity and Micromechanics**  
**Engineering Materials, Dynamics**
- Visiting Research Professor** 22-July 2011 to 26-Sep 2011  
School of Mechanical and Materials Engineering  
Washington State University
- Visiting Professor** 26-Sep 2011 to 02-Feb 2012  
Department of Materials Science and Engineering  
McMaster University, Ontario, Canada
- Visiting Assistant Professor** Aug 2007– Aug 2008  
Department of Mechanical Engineering  
Villanova University, PA  
Teaching: **Static, Dynamics, Solid Mechanics and Materials Labs**
- Instructor** Aug 2005–March 2006  
Department of Mechanical Engineering  
California State University, Northridge, CA  
Teaching : **Advanced Machine Design**
- Postdoctoral Research Associate** May 2005–Aug 2007  
W. M. Keck Computational Materials Theory Center  
California State University, Northridge, CA  
*Research title:*  
1- “Modeling of Dislocations Core Structures in Nanometallic Multilayers.”

Funded by: **Air Force Office of Research**

2- "Modeling of Deformation Twins in Nanocrystalline Face-Centered-Cubic Metals." Funded by: **National Science Foundation**

**Research Assistant**

Washington State University, Pullman, WA.

Jan 2004–May 2005

*Research title:* "Modeling of High Strain Rate Deformation and Strain Localization in FCC Single Crystals: Dislocation Dynamics Analyses." Funded by: **Lawrence Livermore National Laboratory**

**Teaching Assistant**

Washington State University, Pullman, WA.

Jan 2001–Dec 2003

Helped teaching courses: System Dynamics, Dynamics

**Instructor**

Wadi Al-sir Community College (UNRWA), Amman, Jordan

Jan 2000-June 2000

*Independently taught courses: Strength of Materials, Machine Design*

**Teaching Assistant**

University of Jordan, Amman, Jordan

Sep 1998 – June 1999

## **INTERNSHIP**

**Summer Institute for Graduate Students**

Lawrence Livermore National Laboratory

Duties: Conducting numerical simulation on the mechanical behavior of metals under shock loading conditions

June 2002–Aug2002

## **WORKSHOPS**

**ABET workshop on Sustainable Assessment.**

January 30, 2010–Feb 01, 2010

## **PUBLICATIONS**

**2013**

1. Micheal Kattoura and Mutasem Shehadeh, **2013** "Modeling the Low Cycle Fatigue in Copper Single Crystal: Multiscale Dislocation Dynamics Simulations". *Accepted for publication. Proceedings of the Sixth International Conference on Multiscale Materials Modeling, Singapore.*

**2012**

1. Shehadeh, M.A., **2012**. "Multiscale Dislocation Dynamics Simulations of Shock Induced Plasticity in Small Volumes." In review Philosophical Magazine Volume 92, Issue 10, 2012

**2011**

1. M. Shehadeh, **2011**, "Modeling Shock Induced Plasticity in Copper Single Crystal: Numerical and Strain Localization Issues." Advanced Materials Research . Volume 324., 193-196

**2010 and Before**

1. Shehadeh, M.A., **2009** "Modeling of shock interaction with shock waves in small volumes" Computational Plasticity X - Fundamentals and Applications

2. S. Banerjee, M. Shehadeh, G. Lu, N. Kioussis and N. Ghoniem “A Multiscale Approach for the Determination of Nonsingular Elastic Fields of Dislocations in Bulk and Nano-layered Materials” ASME International Mechanical Engineering Congress and Exposition, Proceedings 10 PART B, **2008**, pp. 1057-1065.
3. Shehadeh, M. A., Lu, G., Kioussis, N., Ghoneim, N., **2007**. “Modeling of Nano-twins in FCC Single Crystals: A hybrid atomistic-continuum study”. *Applied Physics Letters*. Volume 91, 171905
4. Shehadeh, M. A., Lu, G., Banerjee, S., Kioussis, N., Ghoneim, N., **2007**. “Dislocation transmission across Ni/Cu interface: A hybrid atomistic-continuum study”. *Philosophical Magazine*. Volume 87 issue 10, 1513 - 1529
5. Shehadeh, M. A., Bringa, E. M., Zbib, H. M., McNaney, J. M., Remington, B. A., **2006**. “Multiscale simulations of shocked-induced plasticity” : *Applied Physics Letters*. Volume 89, 171918
6. Cheng, G. J., Shehadeh, M. A., **2006**. “Multiscale Dislocation Dynamics Analyses of Laser Shock Peening in Silicon Single Crystal. In Press”. *International Journal of Plasticity*. Volume 22, Issue 12, 2171-2194.
7. Shehadeh, M. A., Lu, G., Banerjee, S., Kioussis, N., Ghoneim, N. “Dislocation Core Properties in Ni/Cu bi-crystal: A hybrid atomistic-continuum study” in the Third International Conference on Multiscale Materials Modeling. September 16-22, **2006** Freiburg, Germany
8. Shehadeh, M. A., Zbib, H. M., de la Rubia, T. D., **2005**. “Modeling the dynamic deformation and patterning in FCC single crystals at high strain rate: dislocation dynamic plasticity analysis”. *Philosophical Magazine*, Vol 85, No. 15, pp 1667-1685
9. Shehadeh, M. A., Zbib, H. M., de la Rubia, T. D., **2005**. “Multiscale Dislocation Dynamics Simulations of Shock Compression in Copper Single Crystals”. *International Journal of Plasticity*, Volume 21, Issue 12, December 2005, 2369-2390
10. Cheng, G. J., Shehadeh, M. A., **2005**. “Dislocation Behavior in Silicon Crystal Induced by Laser Shock Peening: A multiscale simulation approach. *Scripta Materialia*, Volume 53, Issue 9, November, 1013-1018
11. Mutasem Shehadeh and Hussein Zbib., V., “Plastic deformation in High Pressure, High Strain Rate Shocked Materials: Dislocation Dynamics Analyses” in Chemistry at Extreme Conditions. Edited by: M. Riad Manna. May **2005**, Elsevier Science Ltd.
12. Mutasem A. Shehadeh, Hussein M. Zbib, Tomas Diaz de la Rubia., “Multiscale Modeling of Shock-Induced Plasticity in Copper Single Crystals”, in Plasticity and Metal Forming: Material Response and Multiscale Modeling, pp. 451-453, Edited by: Akhtar S. Khan and Amir R. Khoei, **2005**, Neat Press
13. Hussein M. Zbib, Masato Hiratani, and Mutasem Shehadeh., “Multiscale Discrete Dislocation Dynamics Plasticity” in Continuum Scale Simulation of Engineering Materials: Fundamentals-Microstructures-Process Applications. Edited by: Dierk Raabe, Franz Roters, Frederic Barlat, Long\_qing Chen, **2004**, Wiley-VCH Verlag GrnbH & Co.
14. Zbib, H. M., Shehadeh, M., Khan, S. M. A., and Karami, G., **2003**. “Multiscale Dislocation Dynamics Plasticity”, *International Journal for Multiscale Computational Engineering*, vol. 1(1), pp. 73-89.
15. Shehadeh, M. A., Zbib, H. M., de la Rubia, T.D., and Bulatov, V., “Multiscale Analyses of High Strain Rate Deformation: Anisotropic Effects” in IUTAM Symposium on

Mesosopic Dynamics of Fracture Process and Materials Strength, pp. 183-192, July-2003  
Osaka, Japan

16. Shehadeh, M. A., Zbib, H. M., de la Rubia, T.D., and Bulatov, V., “*Multiscale analysis of dynamic deformation in monocrystals*” in IUTAM Symposium on Multi-Scale Modeling and Characterization of Elastic-Inelastic Behavior of Engineering Materials, pp. 367-378, October- 2002, Marrakesh, Morocco
17. Shehadeh, M.A., Al-Qaisia, A., 2002 “ *Steady State Response and Stability of Restrained Beam Carrying an Intermediate Mass and Rotary Inertia.*” *Dirasat Journal of Engineering Sciences*, 29(2), pp. 150-175.

## CONFERENCES

ASME 2012: IV Mechanical Engineering Congress and Exhibition **Nov 12-17, 2012**, Houston, TX,  
Technical Presentation:

*Title: Multiscale Modeling of Thin Films Deformation at the Sub-Micrometer Length Scale*

ECCM2010: IV European Conference on Computational Mechanics, **May 16-21, 2010**, Paris, France,  
Technical Presentation:

*Title: Numerical and Strain Localization Issues in Modeling Shock-Dislocation Interaction*

COMPLAS X: X International Conference on Computational Plasticity, **September 02-04**, 2009,  
Barcelona, Spain, Technical Presentation:

*Title: Dislocation Interaction with Dislocations in Small Volume*

7<sup>th</sup> World Congress on Computational Mechanics, **July 16-22, 2006**, Los Angeles, CA Technical presentation:

*Title: Dislocation Threading across Cu/Ni Interface: Hybrid Atomistic-Continuum Study*

2004 ASME International Mechanical Engineering Congress, **Nov-2004**, Anaheim, CA – Technical presentation.

*Title: Dislocation Nucleation Under Shock Loading.*

MRS Spring Meeting , **April-2004**, SanFrancisco, CA. Technical Presentation

*Title: Modeling of High Strain Rate Deformation and Strain Localization in FCC Single Crystals: Dislocation Dynamics Analyses*

2003 ASME International Mechanical Engineering Congress, **Nov-2003**, Washington, D.C – Technical presentation.

*Title: Modeling of Deformation and Patterning in FCC Single Crystals at High Strain Rate.*

The Seventh U.S National Congress on Computational Mechanics, **July-2003**, Albuquerque, NM – Technical presentation

*Title: Modeling the dynamic behavior of FCC single crystals under shock loading: dislocation dynamic plasticity analysis.*

13<sup>th</sup> American Physical Society Topical Conference of SHOCK COMPRESSION OF CONDENSED MATTER, **July 21-25 (2003)**, Portland, OR

MRS Spring Meeting 2003, **April-2003**, SanFrancisco, CA. Technical Presentation

*Title: Dislocations and Strength in Shocked Ta.*

14<sup>th</sup> US National Congress on Theoretical and Applied Mechanics. **June-2002**, Blacksburg, VA.-Technical Presentation

*Title: Modeling the Behavior of FCC Single Crystals Under Shock Loading: Dislocation Dynamic Analysis.*

MRS Spring Meeting 2001, **April-2001**, SanFrancisco, CA.

## **PROFESSIONAL AFFILIATIONS**

**American Society of Mechanical Engineers** (Oct 2003 – present)

**Materials Research Society** (April 2001 –present)

**Jordanian Engineering Society** (1998 –present)

## **GRADUATE COURSE WORK**

Continuum mechanics, Solid mechanics, Theory of plasticity, Crystal plasticity, Finite element methods, Advanced mechanical vibrations, Mechanical measurements, System dynamics, Advanced thermodynamics, Thermodynamics of materials, Solar Energy, Advanced mathematical methods, Advanced numerical analysis.

## **COMPUTER SKILLS**

### **Programming**

Fortran, Matlab

### **Software**

Abaqus, Ansys, Adina, Mathematica, Tecplot, AutoCAD,  
Windows based software such as Word, Excel, PowerPoint

### **Hardware**

PC, UNIX