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## Education

- 2003-2008 Ph.D. in Aerospace Engineering, University of California, Los Angeles**  
MAJOR FIELD: Solids and Structures  
MINOR FIELDS: 1) Applied Plasma Physics and Fusion Technology  
2) Dynamics  
GPA: 3.983/4.0 (18 graded courses)  
AWARD: **Outstanding Ph.D. Award in Aerospace Engineering**, from the University of California, Los Angeles, 2008.  
DISSERTATION: **“Size Effects on Plasticity and Fatigue Microstructure Evolution in FCC Single Crystals”**
- 2001-2003 M.S. in Aerospace Engineering - Cairo University, Egypt**  
EMPHASIS: Structural Dynamics  
OVERALL GRADE: Distinction (7 graded courses)  
DISSERTATION: **“Stress Wave Propagation and Dynamic Failure of Structures under Impact Loads”**
- 1996-2001 B.S. in Aerospace Engineering - Cairo University, Egypt**  
OVERALL GRADE: Distinction with Honor Degree (82 graded courses)  
**Ranked Second on Class**

## Professional Experience

- 2008-Present Research Engineer (Universal Technology Corp.)**  
**Advanced Metals Group, Wright-Patterson Air Force Lab, Dayton, OH**  
Current work involves the development of computational methods that allow direct simulation of plasticity at the microstructure level, which is critical in addressing the Air Force's needs for creating next generation materials. These modeling and simulation techniques have the potential of reducing the cost and time of experiments that need to be conducted to gain fundamental insight into new materials.
- 2005-2008 Engineering Research and Computational Consulting**  
**Digital Material Solutions Inc., Los Angeles, CA**  
Consulting and contract work on a number of research projects:
- Development of Innovative, Ultra-High Heat Flux Components (HHFC) for Fusion Energy Reactors and for Aerospace industries.
  - Development of a MATLAB based finite element code to model the thermo-mechanical response of foam structures and for the optimization analysis of foam structures to be used in the design of high heat flux cooled components.
  - Development of a high performance cloth simulation codes for 3D animations
- 2003-2008 Graduate Student Researcher**  
**Mechanical & Aerospace Engineering Department, UCLA**  
Research interests:
- Three dimensional modeling of the experimentally observed size effects on the strength of micro-crystals. From these modeling results a new “weakest-link mechanism” was developed to rationalize the observed size effects.
  - Three dimensional modeling of the effects of the material microstructure on fatigue crack nucleation in copper and nickel-based superalloys (application on aircraft turbine engine blades).

- Experimental, finite element modeling (using SOLIDWORKS, COSMOS, and ANSYS), and theoretical analysis of the failure strength and toughness of Vapor Plasma Sprayed (VPS) and Hot Isostatic Pressed (HIP) Tungsten coatings for the first wall fusion reactor armor in the High Average Power Laser Program, HAPL (<http://www-ferp.ucsd.edu/HAPL/>).
- Finite element modeling (using SOLIDWORKS, COSMOS, and ANSYS) of the U.S. Dual Coolant Pb-Li Test Blanket Module (DCLL-TBM) for the international experimental fusion reactor, ITER, to be built in Cadarache, France ([www.iter.org](http://www.iter.org)).

**2001-2003 Graduate Student Researcher**  
**Department of Aerospace Engineering, Cairo University**

Research interests:

- Two dimensional modeling of wave propagation in solids and the dynamic failure of structures under impact loads.

**2000 Summer Intern Technician**  
**Electrical Vehicle Engineering Division, Space Systems/Loral, Palo Alto, California**  
 Coordinate and perform parallel non interfering automated and manual tests on different satellite subsystems.

### **Teaching Experience**

**2004-2007 Teaching Assistant**  
**Mechanical & Aerospace Engineering Department, UCLA**  
 Prepare and conduct discussion classes for the following courses:

- Introduction to Space Technology
- Dynamics of Particles and Rigid Bodies
- Mechanical Product Design.

**2001-2003 Teaching Assistant**  
**Department of Aeronautical & Astronomical Engineering, Cairo University**  
 Prepare and conduct discussion classes for the following courses:

- Analysis of Structure
- Mechanics of Light Structures
- Theory of Plates and Shells
- Machine Design, Aircraft Structure Design.

### **Professional Services**

- Member on the International Organizing Committee of the “4<sup>th</sup> International Conference on Multiscale Materials Modeling”, Tallahassee, Florida, October 2008.
- Review and referee technical papers submitted to: Material Science & Engineering A, Journal of ASTM International, Fusion Science and Technology.

### **Professional Societies**

- Materials Research Society (MRS)
- The Minerals, Metals & Materials Society (TMS)

### **Awards**

- Outstanding PhD Award in Aerospace Engineering, from the University of California, Los Angeles, 2008.
- Collegiate All-American Scholar Award, 2004.
- The Award of the Egyptian Engineering Syndicate for the first on class graduates from Egyptian Engineering Collages, September, 2001.
- First place award among all scientific projects at Egyptian Universities, by the High University Board of Egyptian, for the design of the first Egyptian nano-satellite, May, 2001.
- Award of the Ideal Student of the Faculty of Engineering, Cairo University, by the Faculty of Engineering, Cairo University, 1999 – 2000.

## Computer Skills

Varying experience with the following:

- Programming Languages: FORTRAN, C, and C++.
- Application Programs: ANSYS, SOLIDWORKS, COMSOL, AUTOCAD, NASTRAN, MATLAB, and MAPLE.

## Refereed Journal Publications

- J.A. El-Awady, M. Wen and N.M. Ghoniem, “**The Role of the Weakest Link Mechanism in Controlling the Plasticity of Micropillars**”, Journal of the Mechanics and Physics of Structures, Accepted for Publication, 2008.
- H. Kim, J. El-Awady, V. Gupta, N. Ghoniem and S. Sharafat, “**Interface Strength Measurement of Hot Isostatic Pressed Tungsten Coatings on F82H Substrates**”, Journal of Nuclear Materials, Accepted for Publication 2008.
- J.A. El-Awady, S.B. Biner, N.M. Ghoniem, “**A Self Consistent Boundary Element, Parametric Dislocation Dynamics Formulation of Plastic Flow in Finite Volumes**”, Journal of the Mechanics and Physics of Structures, Volume 56, Number 5, pp. 2019-2035, 2008.
- S. Sharafat, J. El-Awady, S. Liu, E. Diegele and N.M. Ghoniem, “**Propose Damage Evolution Model for Large-scale Finite Element Modeling of the Dual Coolant US-ITER TBM**”, Journal of Nuclear Materials, Volumes 367-370, pp. 1337-1343, 2007.
- H. Kim, J. El-Awady, J. Quan, S. Sharafat, V. Gupta, N. Ghoniem, “**Failure Strength Measurements of VPS Tungsten Coatings for HAPL First Wall Armor**”, Fusion Science & Technology, Volume 52, Number 4, pp 875-879, 2007.

### In preparation:

- (invited paper) J.A. El-Awady and N.M. Ghoniem, “**Dose Size Matter? – A Review of the Effects of Size on Strength and Plastic Flow**”, in preparation for the International Journal of Interaction and Multiscale Mechanics, to be submitted in November 2008.

## Conference Proceedings

- J.A. El-Awady, M. Wen, N.M. Ghoniem, “**The influence of focused ion beam induced damaged and the activation of cross-slip on the experimentally observed size effects**”, in the Proc. Of the 4<sup>th</sup> International Conference on Multiscale Materials Modeling, edited by Anter El-Azab, October 2008, Tallahassee, FL.
- J. El-Awady, N. Ghoniem, “**Plastic Flow in Confined Volumes**”, in Plasticity, Failure and Fatigue in Structural Materials-from Macro to Nano: Proceedings of the Hael Mughrabi Honorary Symposium. Edited by K.J. Hsia, M. Göken, T. Pollock, P.D. Portella, and N.R. Moody, pp. 77-88, March 2008, New Orleans, LA.
- S. Sharafat, A. Aoyama, M. Narula, J. El-Awady, N. Ghoniem, B. Williams, “**Development Status of the Helium-Cooled Porous Tungsten Heat Exchanger Concept**”, in the Proc. Of the 22<sup>nd</sup> IEEE Symposium on Fusion Engineering, pp. 1-4, June 2007, Albuquerque, NM.
- J.A. El-Awady, N.M. Ghoniem, and H. Mughrabi, “**Dislocation Modeling of Localized Plasticity in Persistent Slip Bands**”, in the Proc. of the 136th TMS Annual Meeting and Exhibition, Materials Processing and Manufacturing Division Symposium: Mechanics and Materials Modeling and Materials Design Methodologies, in the Honor of Dr. Craig Hartley's 40 years of Contributions to the Field of Mechanics and Materials Science, edited by B. L. Adams and A. Garmestani, pp. 23-35, February 2007, Orlando, FL.
- J.A. El-Awady, A. Takahashi, N.M. Ghoniem, “**Three-dimensional Boundary Element-Dislocation Dynamics Modeling of Plastic Flow in Small Volumes**”, in Multiscale Modeling of Materials, edited by R. Devanathan, M.J. Caturla, A. Kubota, A. Chartier, S. Phillpot (Mater. Res. Soc. Symp. Proc. 978E, Warrendale, PA, 2007).

## Technical Reports

- S. Sharafat, J. El-Awady, N. Morely, A. Ghoniem, N. Ghoniem, “**Flow Channel Inserts**”, DMS Inc. Progress Report on Concept Design and Analysis, 41 pages, April, 2007.
- S. Sharafat, J. El-Awady, N. Morely, A. Ghoniem, N. Ghoniem, “**Low Pressure Drop Heat Exchanger Tubes for Plasma Facing Components**”, DMS Inc. Progress Report on Concept Design and Analysis, 25 pages, April, 2007.
- S. Sharafat, J. El-Awady, N. Ghoniem, “**Advanced W Structures for Plasma-Facing Components for Magnetic Confinement Fusion Reactors**”, DMS Inc. Final Report for ULTRAMET SBIR Phase I, 65 pages, January, 2006.

- C.P.C. Wong, A. Ying, M. Abdou, A. Abou-Sena, Z. An, J. Blanchard, P. Calderoni, D.P. Carosella, M. Dagher, J. El-Awady, P.J. Fogarty, N. Ghoniem, E. Kim, R. Kurtz, M.P. Labar, S. Majumdar, S. Malang, B. Merrill, N.B. Morley, S. Reyes, M. Sawan, S. Sharafat, S. Smolentsev, G. Sviatoslavsky, D.K. Sze, M. Ulrickson, R.S. Willms, M. Youssef, S.J. Zinkle, “**Design Description Document for the U.S. Dual Coolant Pb-17Li (DCLL) Test Blanket Module Report to the ITER Test Blanket Working Group (TBWG)**”, UCLA Report UCLA-FNT-212, General Atomics Report GA-C25027, 196 pages, 2005.

## Contributions in Conferences and Symposiums

- 4<sup>th</sup> International Conference on Multiscale Materials Modeling, Tallahassee, Florida, October 2008. *Invited Talk:* “**3-D dislocation dynamics study of the influence of the focused ion beam induced damage and the activation of cross-slip on the experimentally observed size effects**”
- Advanced Metals Seminar Series, Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio, 2008. *Invited Talk:* “**3-D Modeling of Size Effects on Plasticity and the Fatigue Microstructure Evolution in FCC Single Crystals**”.
- The Minerals, Metals & Material Society (TMS) 137<sup>th</sup> Annual Meeting & Exhibition, New Orleans, Louisiana, March, 2008. *Presentation:* “**Size Scaling Aspects of Plastic Flow in Ni-Single Crystal**”.
- 13<sup>th</sup> International Conference on Fusion Reactor Materials, Nice, France, December, 2007. *Poster:* “**Interface Strength Measurement of Tungsten Coatings on F82H Substrates**”.
- 9<sup>th</sup> US National Congress on computational Mechanics, San Francisco, California, July, 2007. *Presentation:* “**Three Dimensional Dislocation Dynamics Modeling of Size Effects on the Strength of Microcrystals**”.
- The Minerals, Metals & Material Society (TMS) 136<sup>th</sup> Annual Meeting & Exhibition, Orlando, Florida, February, 2007. *Presentation:* “**Dislocation Modeling of Localized Plasticity in Persistent Slip Band**”.
- Material Research Society (MRS) Fall Meeting, Boston, Massachusetts, December, 2006. *Invited Talk:* “**Three-dimensional Boundary Element-Dislocation Dynamics Modeling of Plastic Flow in Small Volumes**”.
- 17<sup>th</sup> Topical Meeting on the Technology of Fusion Energy, Albuquerque, New Mexico, November, 2006. *Poster:* “**Measurement of Interface Bond Strength between Tungsten Coatings and Steel Substrates for HAPL FW Armor**”.
- 7<sup>th</sup> World Congress on Computational Mechanics, Los Angeles, California, July, 2006. *Presentation:* “**Coupled 3-D Parametric Dislocation Dynamic Boundary Element Framework for Finite Geometry**”.
- 12<sup>th</sup> International Conference on Fusion Reactor Materials, Santa Barbara, California, December, 2005. *Presentation:* “**Large-Scale Finite Element Modeling of the Thermo- Mechanical Behavior of the Dual Coolant US-ITER TBM Incorporating Damage Evolution**”.
- International Conference on Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments, Madrid, Spain, 2005. *Poster:* “**Boundary Element Representation of Interfacial Forces in 3-D Dislocation Dynamics**”.

## Workshops and Meetings

- High Temperature Aerospace Materials Program Contractors Review, May, 2008. *Presentation:* “**Atomistic-Dislocation Dynamics Modeling of Fatigue Microstructure and Crack Initiation**”.
- Inertial Fusion Energy Science & Technology Strategic Planning Workshop, San Ramon, CA, April, 2007. *Poster:* “**Failure Strength Measurements of VPS Tungsten Coating for HAPL First Wall Armor**”.
- 16<sup>th</sup> High Average Power Laser Workshop, Princeton Plasma Physics Laboratory, Princeton, NJ, December 2006. *Presentation:* “**Comparison of HIP and VPS Tungsten Coating Behavior Using Laser Spallation Technique**”.
- 13<sup>th</sup> High Average Power Laser Workshop, University of Rochester’s Laboratory for Laser Energetics, Rochester, NY, November, 2005. *Poster:* “**Measurement of W-F82H Bond Strength Using Laser Spallation Interferometer**”.
- ITER-Test Blanket Module Meeting, University of California, Los Angeles, CA, March, 2005. *Presentation:* “**Dual Coolant Pb-Li ITER-Test Blanket Module: Design for Accident Relevant Loading**”.
- 12<sup>th</sup> High Average Power Laser Workshop, Lawrence Livermore National Laboratory, Livermore, CA, June, 2005. *Poster:* “**Measurement of W-Armor Interfacial Properties Using a Nanosecond Laser Source**”.

## References

- 1. Prof. Nasr M. Ghoniem** ([ghoniem@ucla.edu](mailto:ghoniem@ucla.edu))  
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