

Jaafar A. El-Awady

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Mechanical & Aerospace Engineering Department
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EDUCATION

- 2003-Present** **Ph.D. Candidate in Aerospace Engineering**
University of California, Los Angeles
Expected Graduation Date (December 2007)
MAJOR FIELD: Solids and Structures
MINOR FIELDS: 1) Applied Plasma Physics and Fusion Technology
 2) Dynamics
GPA: 3.983/4.0 (18 graded courses)
DISSERTATION: “Large-scale Dislocation Dynamics Simulations of Fatigue
 Microstructure and Crack Initiation in Copper and Nickel-
 based Superalloys”
- 2001-2003** **M.S. in Aerospace Engineering**
Cairo University, Egypt
EMPHASIS: Structure 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.

Teaching Experience

- 2004-Present** **Teaching Assistant**
University of California, Los Angeles, Mechanical & Aerospace Engineering
Department, Los Angeles, CA
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**
Cairo University, Department of Aeronautical & Astronomical Engineering,
Cairo, Egypt
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 Experience

2006-Present

Technical Journal Reviewer

Review and referee technical papers submitted to:
Fusion Science and Technology, American Nuclear Society

2005-Present

Engineering Research and Computational Consulting (2005-Ongoing) Digital Material Solutions Inc., Los Angeles, CA

Consulting and contract work on a number of research projects:

- Development of a high performance cloth simulation code for 3D animations
- Development of Innovative, Ultra-High Heat Flux Components (HHFC) for Fusion Energy Reactors and for Aerospace industries.
- Design of an Ultra-Low Pressure Drop Tungsten-Foam Heat Exchanger.
- Development of a MATLAB based code to model heat transfer in foam structures.
- Development of a MATLAB based finite element code to model the thermo-mechanical response of foam structures.
- Optimization analysis of foam structures to be used in the design of high heat flux cooled components.

2003-Present

Graduate Student Researcher

University of California, Los Angeles, Mechanical & Aerospace Engineering Department, Los Angeles, CA

Research interests:

- Size effects on the strength of micro-crystals.
- Persistent Slip Bands and Fatigue Failure.
- Effect 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).

2001-2003 **Graduate Student Researcher**
Cairo University, Department of Aeronautical & Astronomical Engineering,
Cairo, Egypt
Research interests:
- Wave propagation in solids
- The dynamic failure of structures under impact loads

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

Computer Skills

Varying experience with the following:

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

SCIENTIFIC AND Professional Societies

- Student Member – American Nuclear Society (ANS)
- Student Member – Materials Research Society (MRS)
- Student Member – The Minerals, Metals & Materials Society (TMS)

Awards

- 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 awarded for scientific projects at Egyptian Universities, by the High University Board of Egyptian, for the design of the first Egyptian nano-satellite, May, 2001.
- Ideal Student of the Faculty of Engineering Award, Cairo University, by the Faculty of Engineering, Cairo University, Egypt, 1999 – 2000.

REFEREED journal Publications

Published

- 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, *In Press*, 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 & Engineering, *In Press*, 2007.
(http://osiris.seas.ucla.edu/papers/2000/ElAwady_FailureStr_VPS_W.pdf)

In Preparation

- Jaafar A. El-Awady, S. Bulent Biner, Nasr M. Ghoniem, “**A Self Consistent Boundary Element, Parametric Dislocation Dynamics Formulation of Plastic Flow in Finite Volumes**”, in preparation for Journal of the Mechanics and Physics of Structures, 2007.
- Jaafar El-Awady, Hyoungil Kim, Vijay Gupta, Nasr Ghoniem, Shahram Sharafat, “**Toughness Measurements of Tungsten Coated Ferritic Steels Using Laser Induced Stress Pulses**”, In preparation for Journal of Nuclear Materials, 2007.
- Hyoungil Kim, Jaafar El-Awady, Vijay Gupta, Nasr Ghoniem and Shahram Sharafat, “**Interface Strength Measurement of Hot Isostatic Pressed Tungsten Coatings on F82H Substrates**”, In preparation for Journal of Nuclear Materials, 2007.
- Shahram Sharafat, Jaafar El-Awady, Nasr Ghoniem, Brian Williams, and Dennis Youchison, “**CFD-Based Thermo-Hydraulic Modeling of Ultra-Low Pressure Drop Tungsten-Foam Heat Exchanger**”, In preparation for Journal of Nuclear Materials, 2007.

Conference Proceedings

- J. A. El-Awady, N. M. Ghoniem, and H. Mughrabi, “**Dislocation Modeling of Localized Plasticity in Persistent Slip Bands**”, Proc. of the 136th TMS Annual Meeting and Exhibition, Materials Processing and Manufacturing Division Symposium: Mechanics and Materials Modeling and Materials Design Methodologies, edited by B. Adams and A. Garmestani, Feb. 25 - Mar. 1, 2007, Orlando, Florida.
(http://osiris.seas.ucla.edu/papers/conferences/El_Awady_TMS07.pdf)
- Jaafar A El-Awady, Akiyuki Takahashi, Nasr 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.
(http://www.fusion.ucla.edu/ITER-TBM/Documents/dcll_DDD_2005.pdf)

Contributions in Conferences and Symposiums

- The Minerals, Metals & Material Society (TMS) 136th 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. *Presentation*: “**Three-dimensional Boundary Element-Dislocation Dynamics Modeling of Plastic Flow in Small Volumes**”.
- 17th 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**”.
- 7th World Congress on Computational Mechanics, Los Angeles, California, July, 2006. *Presentation*: “**Coupled 3-D Parametric Dislocation Dynamic Boundary Element Framework for Finite Geometry**”.
- UCLA Engineering Research Review, Los Angeles, California, April, 2006.
- 12th 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**” 2nd International Multiscale Material Modeling, Los Angeles, California, September, 2004.

Workshops and Meetings

- Inertial Fusion Energy Science & Technology Strategic Planning Workshop, San Ramon, CA, April, 2007.
- 16th 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**”.
(<http://www-ferp.ucsd.edu/HAPL/MEETINGS/0612-HAPL/Presentation/ElAwadyBond.ppt>)
- 13th 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**”.
(<http://aries.ucsd.edu/HAPL/MEETINGS/0511-HAPL/Posters/ElAwady.ppt>)
- 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**”.
([http://www.fusion.ucla.edu/ITER-TBM/ITER-TBM4/module_fem_results_feb_23_05\(1\).ppt](http://www.fusion.ucla.edu/ITER-TBM/ITER-TBM4/module_fem_results_feb_23_05(1).ppt))
- 12th 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**”
(http://aries.ucsd.edu/HAPL/MEETINGS/0506-HAPL/poster_elawady.ppt)