

Hisham A. Abdel-Aal, Ph.D

EDUCATION

The University of North Carolina at Charlotte, Charlotte, NC, USA, 1996-1998, Ph.D., Mechanical Engineering, December 1998,
Tuskegee University, Tuskegee AL., USA, M. S., Mechanical Engineering, May 1994,
Alexandria University, Alexandria, Egypt.
Diploma of Higher Graduate Studies, Fluid Mechanics, June 1989
M. Sc., Mechanical Engineering, June 1987
B. Sc., Mechanical Engineering, November 1984

WORK EXPERIENCE

United States

Associate Teaching Professor Sep. 2013-Current,
Department of Mechanical Engineering, Drexel University, Philadelphia, PA
Visiting Professor, August 2012-May. 2013,
Department of Mechanical Engineering, University of North Carolina-Charlotte,
Charlotte, NC.
Assistant Professor, August 2004-January 2009,
Department of General Engineering, University of Wisconsin-Platteville, Platteville, WI
Assistant Professor, August 2003-May 2004,
Department of Engineering Technology, East Carolina University, Greenville, N. C.
Adjunct Professor, August 2002-June 2003,
Institute of Manufacturing & Dept. Mechanical Engineering Technology, York Technical
College, York, S. C.

International

Guest Research Professor June 2013-August 2013,
National University of Colombia (Medellin),
Research Professor, January 2008- March 2012,
Arts et Metiers ParisTech-Centre CHÂLONS-EN-CHAMPAGNE, France
Research Professor May 2008-June 2008,
Laboratoire de Physique et Mécanique des Matériaux (LPMM) UMR-CNRS Université
Paul Verlaine – Metz, France
Invited Professor June 2006-December 2006,
Laboratoire de Mécanique et Procédé de Fabrication (LMPF), ENSAM - Châlons en
Champagne, France.

PROFESSIONAL AFFILIATIONS

American Society of Mechanical Engineers (ASME),
Society of Tribologists and Lubrication Engineers (STLE),
New York Academy of Science.
Society of Manufacturing Engineers (SEM),
American Society of Precision Engineering
Society of Bionic Engineering
Royal Aeronautical Society

PROFESSIONAL SERVICES

Guest Editor

Special issues:

1. Complexity, Synergy and Emergence in Sliding Systems Int. J. of Materials and Product Tech, Vol. 38 (1) 2010.
2. Design in Nature, Int. J. of Design Engineering (Vol 4 no 1, 2011)
3. Bionics: From Inspiration to Design, Int. J. of Design Engineering (Vol 4 no 4, 2011)

Conference Chairmanship and organization

1. Chair Nano-tribology (wear modeling session) WOM (wear of materials) conference, April, 25-28, San Diego, CA, 2005.
2. Chair Experimental Wear Techniques, ECOTRIB2009, Pisa, Italy, June 7-10, 2009
3. Symposium Organizer, Tribology ART Vs Science, Pisa Italy, June 2009
4. Co-Organizer Symposium, New frontiers in modeling and simulation of composite and metallic field machining, ICCMSE, Greece, Sep. 2009.
5. Coatings and Bearings session Turkeytrib 2015, 1st international conference on tribology, 07-09, October, 2015, Istanbul, Turkey.

INTERNATIONAL COLLABORATION

Laboratoire de Mécanique et Procédés de Fabrication (LMPF), ENSAM CER Châlons-en-Champagne, France.

Laboratoire Matériaux Endommagement Fiabilité Ingénierie des Procédés (LAMEFIP), ENSAM CER Bordeaux, France

National University of Colombia (Medellin, Colombia)

Ecole Centrale de Lyon (biomedical-biomimetics laboratory)

Universidad Tecnica Federico Santa Maria - Ingenieria en Chile

Yedeltipi University, Istanbul, Turkey

PATENTS

Wear reduction in Cutting Tools through biasing with a DC Current T09003US (1509.060)

Bio-Inspired Surfaces for Enhanced Tribological Performance- New Disclosure No. 15-1782 (Drexel office of Technology Commercialization), Provisional-Patent-Application-DRX.P017.US.60 : 15-1782

PUBLICATIONS (selected)

Book Chapters

1. Hisham A Abdel-Aal "Review of Friction and surface properties of snakeskin," Book Chapter in upcoming book, Handbook of Research on Biomimetics and Biomedical Robotics, ed, Maki Habib, December, (2017) ISBN13: 9781522529934, DOI: 10.4018/978-1-5225-2993-4, IGI Global
2. H. A. Abdel-aal, *The structure of Ventral Scale Textures in Snakes in comparison to Texturing of Deterministic Tribological Surfaces*, to appear in: Processing Techniques and Tribological Behavior of Composite Materials, Rajnesh Tyagi, J. P. Davim (eds)-IGI-Global Publication (2015) 268-316, ISBN13: 9781466675308
3. H. A. Abdel-aal, *Measurement of contact temperatures*, in: Encyclopedia of Tribology, Wang, Q. Jane; Chung, Yip-Wah (Eds.), Springer, ISBN 978-0-387-92896-8, 2012.

4. H. A. Abdel-Aal, *Flash temperature theory*, in Encyclopedia of Tribology, Wang, Q. Jane; Chung, Yip-Wah (Eds.), Springer, ISBN 978-0-387-92896-8, 2012.
5. H. A. Abdel-Aal, *Thermodynamics of Wear*, in Encyclopedia of Tribology, Wang, Q. Jane; Chung, Yip-Wah (Eds.), Springer, ISBN 978-0-387-92896-8, 2013.

Editorials

1. *Design in Nature*, Int. J. of Design Engineering 4 ,1, (2011) 1-5
2. *Bionics: From Inspiration to Design*, Int. J. of Design Engineering, 4, 2 (2011) 1-4.
3. *Complexity, Synergy and Emergence in Sliding Systems*, Int. J. of Materials and Product Tech, Vol. 38 (1) 2010.

Discussions

1. H. A. Abdel-Aal, Discussion Wear rate and entropy generation sources in a Ti6Al4V - WC/10Co sliding pair, J. Trib., doi:10.1115/1.4037466
2. H. A. Abdel-Aal, Discussion Prediction of tribological limits in sliding contacts: flash temperature calculations in sliding contacts and material behavior, ASME J. Tribol, 2017 (doi:10.1115/1.4034824).
3. H. A. Abdel-Aal, Discussion Specific Heat of Tribological Wear Debris Material. ASME. J. Tribol., 2015;137(3):031601-031601-6.

Archival Papers

1. Abdel-Aal, H. A., Surface structure and tribology of legless squamate reptiles, (2018) JMBBM,79,2018,354-398, <https://doi.org/10.1016/j.jmbbm.2017.11.008>.
2. H. Abdel-Aal; H. Zahouani; M. El Mansori, A comparative Study of Frictional Response of Shed Snakeskin and Human Skin, (2017) WEAR 376–377, A, 281–294, <https://doi.org/10.1016/j.wear.2016.12.055>.
3. P. Cuervo, D.A. López, J.P. Cano, J.C. Sánchez, S. Rudas, H. Estupiñán¹, A. Toro, H. A. Abdel-Aal, Development and tribological behavior of snake-inspired Ti6Al4V surfaces with deterministic patterns, STMP-IOP, 4, 2, (2016) doi/10.1088/2051-672X/4/2/024013.
4. H. A. Abdel-Aal, Functional Surfaces for Tribological Applications: From Inspiration to Design- Topical Review STMP-IOP, (2016) 4 043001, doi/10.1088/2051-672X/4/4/043001
5. H. A. Abdel-Aal M. El Mansori ,Characterization of Load Bearing Metrological Parameters in Reptilian Exuviae In Comparison To Plateau Honed Surfaces, IOP-J. Surf. Topogr.: Metrol. Prop. 2 (2014) 045002
6. H.A. Abdel-Aal, M. El Mansori, Wear of WC-Co Inserts in Dry High Speed Machining of Submicron Particle Size Aeronautical Grade near β Titanium Alloy, *Mécanique et Industrie*15. (2014) 413-426
7. H. A. Abdel-Aal, On Surface Structure and Friction Regulation in Reptilian Locomotion, Journal of the Mechanical Behavior of Biomedical Materials (2013), 115-135, DOI: 10.1016/j.jmbbm.2012.09.014
8. H. A. Abdel-Aal, M. El Mansori, Tribological analysis of ventral scale structure in a python regius in relation to laser textured surfaces IOP-J. Surface Topography: Metrology and Properties. 1 (2013) 015001, doi:10.1088/2051-672X/1/1/015001
9. H. A. Abdel-Aal, R. Vargiolu, H. Zahouani, M. El Mansori, Preliminary Investigation Of The Frictional Response Of Reptilian Shed Skin, *WEAR* 290–291 (2012) 51–60 doi./10.1016/j.wear.2012.05.015
10. M. Bigerelle, H. Abdel-Aal H. A., Alain Iost, Relation between entropy, free energy and computational energy, Int. J. Mat. Prod. Tech.,(2010) 38, (1), 35-43.
11. Hisham A. Abdel-Aal, Concerning the influence of frictional energy Dissipation on Wear transition in Dry tribosystems, Int. J. Mat. Prod. Tech., 38 (1), 78-92.
12. Hisham A. Abdel-Aal, The Metallic Silicon Phase β -Si-II: Influence of Transport Properties on Ductile Regime Processing for MEMS and NEMS Applications, *Int. Journal of Micro-engineering and Nano-electronics*(2010) 1(1), 35-47

13. H. Abdel-Aal, On the strength of tribo-emission from mono-crystalline silicon surfaces, *Int. J. Prec Tech*, 1, 3-4 (2010) 331 – 342

Refereed Conference Papers

1. Abdel-Aal, H. A., On the thermodynamics of running-in, World Tribology Congress, Peking, China, September-2017.
2. Abdel-aal, H. A., Deterministic Surfaces for Hostile Tribo-conditions: from Bio-Inspiration to Functional Design, in The 644. WE-Heraeus-Seminar "Bio-inspired, Nano- and Microstructured Surfaces: New Functionality by Material and Structure", Bad Honnef, Germany, May, 27- 31- 2017.
3. Cuervo, P, López D, Cano J, Sanchez J, Rudas S, Estupiñan H, Toro A, Abdel-Aal, H. A., Topographic characterization of snake skin ventral scales for tribological purposes, VIII Congress of Materials, 28 al 30 de October 2015 , Paipa - Boyacá – Colombia-South America
4. Hisham A Abdel-Aal, hierarchical structure of ventral scales in limbless reptiles as a bio-inspiration for multi-scale deterministic tribological surfaces, proceedings of Turkeytrib 2015, 1st international conference on tribology, 07-09, october, 2015, Istanbul, Turkey
5. Hisham A Abdel-Aal; Dry sliding of wc-co on titanium under the influence of biasing dc-current, proceedings of Turkeytrib 2015, 1st international conference on tribology, 07-09, October, 2015, Istanbul, Turkey
6. Abdel-Aal, H. A., El Mansori, M. The Fractal Structure of the Ventral Scales in Legless Reptiles, 15th International Conference on Metrology and Properties of Engineering Surfaces, March 2-5, 2015, UNC Charlotte, Charlotte, North Carolina, USA
7. H. A. Abdel-Aal, and M. El Mansori, Hierarchical Structure of Ventral Scales in Limbless Reptiles as a Bio-Inspiration for Multi-scale Deterministic Tribological Surfaces, 16th International Conference on Experimental Mechanics, July 7-11 2014 • University of Cambridge, UK
8. H. A. Abdel-Aal, M. EL Mansori, Metrological Structure and Frictional Response of Shed Snakeskin and Human Skin: A Comparative Study, Euro Friction, Wear and Wear Protection, 06.-08.05.2014, Karlsruhe, Germany
9. H.A. Abdel-Aal , N. Trannoy , M. El Mansori scan thermal microscopy investigation into the energetics of the thermal skin in dry fretting of titanium, Proceedings of 3rd European Conference on Tribology, ECOTRIB, June 7-9, 2011; Vienna, Austria
10. H.A. Abdel-Aal, M. El Mansori, Metrological Characterization of Reptilian skin for Green Tribo Surfaces, ASPE Spring Topical Meeting, Freeform Surfaces, March 7, 8, 2011, Charlotte, NC.

Key note Lectures (selected)

1. Tribo-electrification and cutting tools-workpiece interaction in machining hard-to-cut aero-alloys, International Workshop on New Trends, in Aerospace Machining, Challons-sur-Marne, Champagne, Nov 2006, France.
2. *Functional Complexity and Synergy in Tribo-Systems*, Wear Mechanisms and Surface functionalities, WEMESURF-Summer School, Technical University of Vienna, Vienna, Austria September, 04, 2008.
3. Processing of Silicon in the Ductile Regime for NEMS/MEMS fabrication, Keynote Lecture, NanoTech 2009 Malaysia Oct 27th, 2009 Kuala Lumpur, MY
4. Bio Mimitics: a Viable Tool for Design of Deterministic Functional Tribo-Surfaces, 10th Lightweight Materials for Defense December 06 - 08, 2010
5. Sustainable Surface Engineering: Green Tribology Lessons from Squamate Reptiles, Journées Internationales Francophones de Tribologie, JIFT 2012 – Aix en Provence, 9-11 May 2012

Invited Lectures (selected)

1. *Reptilian Surface Structures as Models for Texturing of Deterministic Functional*

- Surfaces, University of Luxemburg, Luxemburg December 2012.
2. *Friction, Entropy, and Irreversibility: Reflections on the Thermodynamics of Wear*, School of Materials Engineering, National University of Colombia, Medellin, Colombia, South America, August 2014
 3. *Bio-Inspired Deterministic Surfaces for Enhanced Tribological performance, lessons from Squamata*, School of Materials Engineering, National University of Colombia, Medellin, Colombia, South America, August 2014
 4. Biological Surface Design Lessons, 10/06/2015/ Yeditepe Üniversitesi, Mühendislik Fakültesi, 34755 Ataşehir / İstanbul Turkey, October 2015
 5. Surface Design for extreme tribological conditions, Technical University of Vienna, Institute of Machine design and manufacturing, Vienna, April 2016.
 6. Bio-Inspiration for design of deterministic surfaces, Hamburg University of Applied Sciences, Hamburg, Germany, May 27, 2016.