

Sonya Teresa Smith, Ph.D.

EARNED DEGREES

University of Virginia	Mechanical and Aerospace Engineering	Ph.D.	1995
University of Virginia	Mechanical and Aerospace Engineering	M.S.	1991
Valdosta State University	Mathematics with Emphasis in Computer Science	B.S.	1986

CITIZENSHIP USA

PROFESSIONAL EXPERIENCE

Department Chair 2011 – 2015

Department of Mechanical Engineering, Howard University

Provided academic leadership and fiscal management toward the achievement of the highest possible level of excellence in the teaching, research and service activities for a department of 10 faculty and approximately 200 undergraduates and 20 graduate students. Evaluated faculty for tenure, promotion and salary increases. Prepared department faculty and students for accreditation reviews.

Professor (2010 – present), ***Associate Professor*** (2001 – 2010), ***Assistant Professor*** (1995 – 2001)

Department of Mechanical Engineering

Teaches undergraduate and graduate courses in the areas of fluid mechanics and thermal sciences. Developed an experimental and computational fluid dynamics research group. Supervises graduate and undergraduate students on sponsored research projects. Serves as faculty advisor to student organizations.

Director, Computer Learning and Design Center (CLDC) 2003- 2015

College of Engineering Architecture and Computer Sciences

Provided leadership and fiscal management for the computational facility in the College. Provided research projects for students. Supervise network administrators, graduate and undergraduate student workers. Initiated fundraising and in-kind donations to the lab.

Visiting Researcher 2004-present

National Institute on Deafness and other Communication Disorders (NIDCD)

Bethesda, Maryland

Conducted computational neuroscience research in auditory mechanics.

Graduate Research Assistant 1989-1995

Department of Mechanical Engineering and Aerospace Engineering

University of Virginia, Charlottesville, Virginia

Conduct computational fluid dynamics research of hydrodynamic instabilities on the underside of highly swept aircraft wings.

Teaching Assistant

1993-1993

Department of Mechanical Engineering and Aerospace Engineering

University of Virginia, Charlottesville, Virginia

Conducted problems sessions in thermodynamics for a class.200 students. Presented lecture in the absence faculty member assigned to the course.

Staff Engineer

1988- 1989

CTA Incorporated, Hampton, Virginia

Provided support for the Space Station Program office at NASA Langley Research Center. Performed feasibility studies for scientific experiments and research facilities proposed for the International Space Station (dual keel configuration)

Programmer/Analyst

1986 – 1988

UNISYS Corporation, Hampton, Virginia

Programming support for the Structural Analysis Branch at NASA Langley Research Center

LEADERSHIP PROFESSIONAL DEVELOPMENT

Workshop on Leadership, Innovation and Entrepreneurship for Women of Color in Academic Engineering, The City College of New York & The Standard Bank

Participated in an action-based initiative for leadership through innovation and entrepreneurship. Engaged with other participants and with experts to gain knowledge of entrepreneurship and the entrepreneurial mindset and how to apply these principles toward the development of personal, professional and institutional strategies for the advancement of women of color in engineering and STEM.

National Women's Leadership Forum, American Council on Education/ Office of Women in Higher Education

Participated in discussions with women presidents and executive search consultants who helped participants develop effective search strategies. The program helped me hone critical leadership skills in areas such as fundraising, risk management, and crisis response. I also participated in media training, mock video-taped interviews and critique, and contract negotiation exercises.

The Aspen Institute Executive Seminar

Exercised personal tools and curiosity to think more critically and deeply about the good society in universities. Cultivated a richer understanding of the human condition through dialogue with other participants. Became professionally re-focused, and better prepared to lead through difficult choices and climate at a University.

Project Kaleidoscope, Faculty for the 21st Century. American Association of Colleges and Universities (AAC&U)

Project Kaleidoscope (PKAL) is AAC&U's STEM higher education program dedicated to empowering STEM faculty, including those from underrepresented groups, to graduate more students in STEM fields who are competitively trained and liberally educated. PKAL also works to develop a scientifically literate citizenry as part of its commitment to principles and practices central to AAC&U's Liberal Education and America's Promise (LEAP) initiative.

SELECTED JOURNAL PUBLICATIONS / REFEREED CONFERENCE PAPERS
(students of Dr. Smith are denoted in bold)

Norman, N., Smith, S., (Accepted - 2015). Reducing Large Viking I based Martian Entry, Descent and Landing Response Surface Methodology Produced Quadratic Models, 66th International Astronautical Congress, Jerusalem, Israel

Norman, N., Smith, S., (2015). Dewar Configuration as an Approach to Maximizing the Cooling of Heat Loads in Two-Temperature Dewars, Thermal and Fluids Engineering Summer Conference, American Society of Thermal and Fluids Engineers

Clarke, M., Norman, N., Smith, S., (2015). Hybrid-MCX-1 BWB Aircraft, ASME 2015 International Mechanical Engineering Congress & Exposition, Houston, TX

Clarke, M., Norman, N., Smith, S., (2015), Construction and Analysis of Subsonic Airfoils for Wind Tunnel Testing, ASME 2015 International Mechanical Engineering Congress & Exposition, ASME International Undergraduate Research and Design Expo

Smith S. T. and R. S. Chadwick. Simulation of the Response of the Inner Hair Cell Stereocilia Bundle to an Acoustical Stimulus. PLoS ONE vol. 6(3), 2011.

Smith, S. and R. Chadwick. "Nanofluidics of Mammalian Hearing." ASME Paper No. IMECE2011-64729, 2011.

Rubaai, A.; **J. Jerry, S. Smith.** Performance Evaluation of Fuzzy Switching of Position Controller for Automation and Process Industry Control. IEEE-IAS Transactions, vol. 47(5), pp. 2274-2282, 2011.

Williams III, A. and S. Smith. "Simulation of Gas and Water Management Strategies in PEM Fuel Cells for UAV." 38th Fluid Dynamics Conference and Exhibit , Seattle, Washington, June 23-26, 2008. Paper Number: AIAA-2008

S. Adams, C. Berry, C. Brown, C. Grant, P. Mead, S. Smith, I. St. Omer. "The Experiences of African American Women Engineering Faculty." ASEE/IEEE Frontiers in Education Conference Proceedings. 1-4244-0257-3/06/\$20.00 © 2006 IEEE

Stern, Xing, Yarbrough, Rothmayer, Rajagopalan, Otta, Caughey, Bhaskaran, Smith, Hutchings, Moeykens "Hands-on CFD Educational Interface for Engineering Courses and Laboratories." *Journal of Engineering Education* vol. 95(1), 2006.

Stern, Yarbrough, Rothmayer, Rajaopalan, Caughy, Bhaskaran, Smith, Hutchings, Moeykens. "Development of an Educational Interface for Hands-on Student Experience in Undergraduate Engineering Courses and Laboratories." *Proceedings of the ASEE Conference.* Paper #1526, 2004.

Ross, B. and Smith, S. "Behavior of Spent Fuel Entrained in Volcanic Magma" *Proceedings of the Waste Management Symposium 2004. February 29-March 4, 2004. Tucson, AZ*

Apted, Kozak, Bursik, King, Morrissey, Ross, Sheridan, Smith, Kessler. Extrusive Release Pathway Scenarios for Yucca Mountain: Analysis and Implications EPRI Report, 2004.

Charity Jr., D.D., S. Smith, and L. Burge III. "Virtual tool development for exploring the Virtual Wind Tunnel(VWT)." Proceedings of the International Conference on Imaging Science, Systems and Technology, *CISST* 2003, pp. 352-357. ISBN:1-892512-46-7.

Smith, Sonya T. and **K. Santy-Ateyaba** “The use of consolidated expansions in modeling anisotropic turbulence.” Advances in Turbulence. 2000.

Smith, S. “Airframe noise resulting from flap side-edge bursting.” AIAA Aeroacoustics Conference , AIAA Paper 2000-1938

Pete, Kimberly R., D.D. Vicroy, S. T. Smith. “Model Validation for Wake-Vortex/Aircraft Encounters.” Submitted to the AIAA Atmospheric Flight Mechanics Conference(refereed) AIAA Paper 2000-1939

Roberts, C.L., D.D. Vicroy, S.T. Smith. ”Comparison of simulations and in-situ measurements of wake-vortex/aircraft encounters.”” AIAA Paper 2000-3908

Smith, S. and Haj-Hariri, H. `` Nonlinear interactions of Gortler vortices and Tollmien-Schlichting Waves in compressible boundary layers." Proceedings of the Fifth Pan American Congress of Applied Mechanics (PACAM V). University of Puerto Rico

Smith, S. and Haj-Hariri, H. "Gortler vortices and heat transfer: a weakly nonlinear analysis." *Physics of Fluids A* **5**, no. 11 pp. 2815-2825.

SELECTED CONFERENCE PRESENTATIONS (students of Dr. Smith are denoted in bold)

S. Smith and R. Chadwick. “Nanofluidics of Mammalian Hearing” ASME 2011 International Mechanical Engineering Congress and Exposition (IMECE), Denver, Colorado, 2011.

S. Smith and R. Chadwick. “Bundle-Fluid Interaction in Mammalian Auditory Mechanotransduction” Association for Research in Otolaryngology (ARO) 34th Midwinter Meeting. Baltimore, MD, 2011.

S. Smith and R. Chadwick. “Effects of Inner Hair Cell Bundle Structure on Mechanotransduction” Association for Research in Otolaryngology (ARO) 32nd Midwinter Meeting. Baltimore, MD, 2009.

N. Wade and S. Smith. “61st Annual Division of Fluid Dynamics Meeting, San Antonio, Texas, 2009.

S. Smith. “Research Interests and Collaboration Opportunities”. Women’s International Research Engineering Summit (WIRES). Barcelona, Spain, 2009.

Williams III, A. and S. Smith. “Simulation of Gas and Water Management Strategies in PEM Fuel Cells for UAV” Paper Number: AIAA-2008-4166, 2008.

Smith, S. and Chadwick, R. “Hydrodynamics of an Inner Hair Cell Stereocilia Pair: towards a transduction model” ARO 30th Midwinter Meeting, Denver, Colorado, 2007.

Smith, S. and Chadwick, R. “Hydrodynamics of an Inner Hair Cell Stereocilia Bundle: on the Origin of Frequency Doubling.” EuroHear. Paris, College de France, 2007.

Smith, S. and Chadwick, R. “Hydrodynamics of Inner Hair Cell Bundle Mechanics” ARO 29th Midwinter Meeting. Baltimore, MD, 2006.

Charity, D., S.T. Smith, and L. Burge “Design of a Virtual Manometer Bank for Virtual Laboratory Experiments”, The 2003 International Conference on Imaging Science, Systems, and Technology (CISST'2003), 2003.

Chen, B. and Smith, S.T. “Radiated Noise due to Vortex Breakdown over a Wing-tip.” 53rd Annual Meeting of the Division of Fluid Dynamics of the APS; Washington, DC, 2000.

Smith, S. and K. Santy-Ateyaba “The use of consolidated expansions in modeling anisotropic turbulence.” Advances in Turbulence, 2000.

Smith, S. “Airframe noise resulting from flap side-edge bursting.” Submitted to the AIAA Aeroacoustics Conference , AIAA Paper 2000-1938, 2000.

Pete, Kimberly R., D.D. Vicroy, S. T. Smith. “Model Validation for Wake-Vortex/Aircraft Encounters.” AIAA Atmospheric Flight Mechanics Conference, AIAA Paper 2000-1939, 2000.

Roberts, C.L., D.D. Vicroy, S.T. Smith. ”Comparison of simulations and in-situ measurements of wake-vortex/aircraft encounters.”” AIAA Atmospheric Flight Mechanics Conference, AIAA Paper 2000-3908 , 2000.

INVITED LECTURES

Gender Summit 5 Africa 2015. The Gender Summit platform was introduced to the continent by a partnership of regional research funders led by the Human Sciences Research Council (HSRC). Partners in South Africa included the Department of Science and Technology, the Department for Women, and the National Research Council, as well as Howard University, USA. The GS5-Africa was received with enthusiastic response from all the participants, who welcomed the idea of applying the gender lens to improve research and development outcomes and the idea that actions must be evidence-based and consensus-led.

Constituency for Africa, Ronald H. Brown Memorial Series. **AFRICAN WOMEN’S EMPOWERMENT THROUGH STEM FORUM.** This Forum, organized in collaboration with the World Bank Group (WBG), African Union Commission (AUC), African Ambassadors’ Group, Consortium of African Diasporas in the U.S. (CADUS), and Howard University, gathered stakeholders from Africa, government, private sector, civil society, and the African Diaspora to continue to share lessons learned and explore strategies regarding African women’s empowerment and development towards Africa’s Agenda 2063. The primary goal of this forum was to promote education, research, and human capacity development in Africa, the U.S., and elsewhere.

Smith, S. and Chadwick, R. “Hydrodynamics of an Inner Hair Cell Stereocilia Bundle: on the Origin of Frequency Doubling.” *EuroHear*. Paris, College de France, 4/27-28, 2007

“The Experiences of African American Women Engineering Faculty.” (Invited Panel Session) S. Adams, C. Berry, C. Brown, C. Grant, P. Mead, S. Smith, I. St. Omer. ASEE/IEEE Frontiers in Education Conference. San Diego, CA October 28-31, 2006

“Are there other Neighborhoods like our own?” Challenger Center Window on the Universe Week; Tuskegee, Alabama 10/2002.

“Modeling and Simulating Natural Phenomena (Atmospheric, Earth, and Fluids Sciences); 2002
SECME Summer Institute; Howard University

“An Anisotropic Subgrid-Scale Model for Large Eddy Simulation.”. Fifth US-Japan Conference on
Flow Simulation and Modeling, Rice University 3/29-30/2000

“Graduate School: Keeping Your Eyes on the Prize.” Keynote Speaker, NAFEO High Technology
Student Expo, 1999

“Trailing-edge vortex breakdown.” National Air and Space Museum SMART workshop; March, 1997

“Modeling and simulation of atmospheric dynamics.” Short Course offered at the NASA URC
Conference; Albuquerque, New Mexico; February, 1997

WORKSHOPS ORGANIZED

Gender Summit 5 Africa 2015. The Gender Summit platform was introduced to the continent by a partnership of regional research funders led by the Human Sciences Research Council (HSRC). Partners in South Africa included the Department of Science and Technology, the Department for Women, and the National Research Council, as well as Howard University, USA. The GS5-Africa was received with enthusiastic response from all the participants, who welcomed the idea of applying the gender lens to improve research and development outcomes and the idea that actions must be evidence-based and consensus-led.

Constituency for Africa, Ronald H. Brown Memorial Series. African Women’s Empowerment Through STEM. This Forum, organized in collaboration with the World Bank Group (WBG), African Union Commission (AUC), African Ambassadors’ Group, Consortium of African Diasporas in the U.S. (CADUS), and Howard University, gathered stakeholders from Africa, government, private sector, civil society, and the African Diaspora to continue to share lessons learned and explore strategies regarding African women’s empowerment and development towards Africa’s Agenda 2063. The primary goal of this forum was to promote education, research, and human capacity development in Africa, the U.S., and elsewhere.

IMECHE 2014 & 2015 ADVANCE Panels. Workshop on Strategies for Women: Career Accomplishments. J. Chen, U. Ghia, P. Norris, S. Smith, K. Thole. International Mechanical Engineering Conference and Exposition, Montreal, CA

Research Day Panel 2016. HU ADVANCE-IT is for you too! : How the Social and Behavioral Sciences (SBS) contribute to the mission of HU ADVANCE-IT. The mission of HU ADVANCE-IT is to attract, promote and retain more women faculty in the STEM disciplines at Howard University. This mission is realized through programs in Education (e.g. Unconscious Bias Training), Advocacy (e.g. Media Campaign), and Empowerment (e.g. Mini-grants). HU ADVANCE-IT also has a significant SBS component that will be catalyzed by the results of a study documenting the experiences of women faculty at Howard. The panelists will discuss strategies to increase participation of SBS women faculty in HU ADVANCE-IT programs and best practices to leverage their input in achieving the HU ADVANCE-IT mission. Strategies for obtaining SBS women faculty by-in as well as strategies for institutionalization of STEM /SBS faculty initiatives are anticipated outcomes of the panel.

“The Experiences of African American Women Engineering Faculty.” (Invited Panel Session) S. Adams, C. Berry, C. Brown, C. Grant, P. Mead, S. Smith, I. St. Omer. ASEE/IEEE Frontiers in Education Conference. San Diego, CA October 28-31, 2006

HONORS AND AWARDS

ORISE Fellowship at the National Institutes on Deafness and other Communication Disorders (NIDCD), May-September, 2010

Ninth Annual ASEE Global Colloquium on Engineering Education/ First Conference of the Global Engineering Deans Council (GEDC). October 17-21, 2010, Singapore

Women's International Research Engineering Summit (WIRES). June 2-4, 2009, Barcelona, Spain.

"Hydrodynamics of an Inner Hair Cell Stereocilia Bundle: on the Origin of Frequency Doubling." (Invited presentation) *EuroHear* Paris, France, April 27-28, 2007

Faculty Author Recognition Certificate (2005-2006)

Science Spectrum Trailblazers, Top Minorities in Science , (2005)

Reviewer, *Aerospace Science and Technology*, 2004

Howard University Science, Engineering, and Mathematics Program Mentor, 2002

Visiting Associate Professor, Department of Mechanical Engineering and Material Science Rice University; Houston, TX (2002)

Visiting Scientist. National Center for Atmospheric Research (NCAR) Boulder, CO (1998)

THESES AND DISSERTATIONS SUPERVISED

"The Effect Of A Rotational Stimulus On Eye Movement During Nystagmus Within A Normal Human Vestibular System." Marie Baronette Okeke, Ph.D. expected May 2016

" Measurement of Residual Resistance Ratio of Cryogenic Materials." Kirsten Lovelace-Sims. M.S. Expected, May 2017

" Computational modeling of Drug Delivery systems." Moses Ukoama. Ph.D. expected, May 2019

"Performance improvement of Proton Emission Membrane Fuel Cell", M.S., Jolomi Erikpara, 5/13

"Efficient Computational Modeling of Twin-screw Extrusion", Ph.D. Henry Fitzpatrick, Department of Mechanical Engineering; 5/09

"Computational Modeling of a PEM Fuel Cell with Gas and Water Management Strategies" M.S. Nasir Wade, Department of Mechanical Engineering; 5/09

"Effect of Optimal Placement of Coolant Channels on PEM Fuel Cell Performance" M.S., Alvester Williams, Department of Mechanical Engineering; 7/08

"Breaking of Atmospheric Gravity Waves" by Levar Young, M.S. , Atmospheric Science 5/06

“Unsteady Aerodynamics for Microvehicle Propulsion.” M.S. by Alicia Jones, Department of Mechanical Engineering; 5/04

“Numerical Simulation of Hypersonic Base Flow about an Elliptical Cone” M.S. by Yang Yang, Department of Mechanical Engineering; 8/04

“Design of a Virtual Manometer Bank for Virtual Laboratory Experiments” by Donald Charity, Master of Systems and Computer Science, 5/03

“Numerical Simulation and in-situ measurements of a B737-300 wake-vortex/aircraft encounters”, by Christopher Roberts, M.S., Department of Mechanical Engineering; 5/01.

“Modeling of Wake-vortex/Aircraft Encounters” by Kimberly Pete, Department of Mechanical Engineering; M.S., 5/99

“The use of consolidated diagrams in modeling anisotropic turbulence”, by Koukommaha Santy-Ateyaba, M.S., Department of Mechanical Engineering; 5/99

SELECTED FUNDED GRANTS

NSF Engineering Research Center (ERC) for Power Optimization for Electro– Thermal Systems (POETS). \$18.4 million (UIUC-lead institution, Howard, Stanford, U. Arkansas) HU receives \$4 Million. 9/2015- 9/2020

NSF ADVANCE- Institutional Transformation (HU ADVANCE-IT) : Women of Color as Change Agents in STEM, \$3.4M, 10/2012-9/2017

Northrop Grumman Corporation. Wintermute: Cryogenics Analysis. \$212,450. 10/2014-9/2015

“The Effect on Inlet Flow Fields of Multi-mode Induced Transition in a Hypersonic Boundary Layer.” 2015-2018, \$300,000. Air Force Office of Scientific Research

JHSV Mission Bay Flow Field Characterization, \$100,000 8/2011-8/2012

NSF Catalyzing International Collaborations: Howard University - Karolinska Institutet Planning Visit. PI S. Smith, \$21,531 9/11-12/12

Flow Control Analysis of Serpentine Inlets using AVUS, DOD, \$200K, 9/04-8/07

“Simulation and Modeling of Airdrop Systems: Far field Wake Analysis” US Army Natick Soldier Center; \$50K 9/01-8/02

“Rotorcraft Icing Severity Detection and Indication System (ISD&IS)”; Boeing Helicopters, Philadelphia, PA; \$80K 1/01-12/01

“The contribution of flap-side edge vortex bursting to airframe noise”; NASA \$217K;10/98-10/01

“Investigation of the relationship of vortex generated sound and airframe noise”, NASA, \$20K, 2/98-10/98

“Multiscale Systems Engineering for Nanocomposites”, NSF, \$1,000 K, 9/03-5/06 (one of three Co-investigators, \$200K for S.T. Smith)

“The Center for the Study of Terrestrial and Extraterrestrial Atmospheres” NASA, \$5000 K;1/97-1/02 (one of 9 Co-investigators)

Goddard Space Flight Center/Howard University Fellowship in Atmospheric Science; NASA \$1,540K, 5/99-4/05, 5/08-5/10

Integration of simulation technology into undergraduate courses and laboratories, NSF, \$90K, 3/1/02-3/1/05

Research Experiences for Undergraduates (REU), NSF, \$30K, 5/1/03-4/30/04

COURSES TAUGHT

Undergraduate:

- Fluid Mechanics
- Thermodynamics
- Applied Thermodynamics

Graduate:

- Acoustics and Noise
- Turbulence
- Computational Fluid Dynamics
- Advanced Heat Transfer
- Advanced Fluid Dynamics

PROFESSIONAL SOCIETY MEMBERSHIPS & SERVICE

American Society of Mechanical Engineers (ASME)

- Faculty Advisor, Howard University Student Chapter
- Faculty Sponsor, Howard University Human Powered Vehicle Team
- NSF ADVANCE Program Panel: IMECH 2014, 2015

American Society for Engineering Education (ASEE)

American Society of Black Engineers (NSBE)

Society of Women Engineers (SWE)

- Faculty Advisor, Howard University student Chapter

Association for Research in Otolaryngology (ARO)

American Physical Society

Sigma Xi Research Honor Society

- President, Howard University Chapter, 2014-2015

Tau Beta Pi Engineering Honor Society

Sigma Gamma Tau, ASME Honor Society

SELECTED PROFESSIONAL SERVICE

National Science Foundation (NSF) HBCU-UP Research Initiation Award Review Panel, 6/2012

National Science Foundation (NSF) ADVANCE-IT Site Visit Team, 5/2011

NSF Graduate Research Fellowship Program (GRFP) Review Panel 2/2010, 3/20

Conference Planning Committee, 2011 Annual Meeting of the American Physical Society Division of Fluid Dynamics (APS-DFD)

Member, Aircraft Safety Subcommittee of the Federal Aviation Association (FAA) Research, Engineering and Development Advisory Committee (REDAC). 2010-2015

National Science Foundation (NSF) East Asia & Pacific Summer Institutes (EAPSI) Review Panel, 1/2009

NSF Nanotechnology Undergraduate Education (NUE) in Engineering (NSF 07-554) Program Review Panelist. 7/9-10/2008

NSF Nanotechnology Undergraduate Education (NUE) in Engineering (NSF 07-554) Program Review Panelist. 7/19-20/2007

NSF CAREER Review Panelist: Quantum, Molecular and High Performance Modeling and Simulation for Devices and Systems (QMHP). 10/31-11/1/2006

“The Experiences of African American Women Engineering Faculty.” S. Adams, C. Berry, C. Brown, C. Grant, P. Mead, S. Smith, I. St. Omer. ASEE/IEEE Frontiers in Education Conference. San Diego, CA 10/28-31/2006

NSF Course, Curriculum, and Laboratory Improvement Program – Adaptation and Implementation (CCLI-A&I) Review Panel 12/2002

SELECTED PUBLIC AND COMMUNITY SERVICE

Docent, National Museum for Women in the Arts (NMWA), 2005-present

Judge, Sixth Grade Science Fair. John Phillip Souza Elementary School, Washington, DC (4/2003, 4/2004)

Visiting Scientist. Challenger Center for Space Science Education. Window on the Universe Week
04/2002 Washington D.C Public Schools
10/2002 Tuskegee Alabama Public Schools
04/2003 Kansas City, Kansas Public Schools
10/2003 Washington, DC Public Schools