AJAY P. KOTHARI

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SUMMARY

Dr. Ajay Kothari is President and Founder of Astrox Corporation, an Aerospace R&D company located in suburban Washington DC. His PhD and MS in Aerospace Engineering are from University of Maryland. He has been Principal Investigator or Program Manager on more than 30 contracts from Air Force, Navy, DARPA and NASA, focused on rocket and hypersonic vehicle designs, system level analysis and studies which have led to his innovative hypersonic vehicle design for the Air Force. He has been a pioneer in developing the Inward Turning Hypersonic Vehicles traveling up to Mach 10 for which a patent was granted, with another patent pending, and which will be able to go to Low Earth Orbit more efficiently using his version of the Rocket Based Combined Cycle (RBCC) concept. He is currently working on reusable rocket transportation which would be more efficient, flexible and more cost effective. He has over 48 professional publications in peer reviewed AIAA (American Institute of aeronautics and Astronautics) journals and various AIAA, International Spaceplanes and Hypersonics, CRASTE (Commercial and Government Reusable Access to Space Technology Exchange) and JANNAF (Joint Army Navy NASA and Air Force) conferences in aerospace field.

He was President of his high school, was recipient of the "Best Student of the School" award for scholarship and extracurricular activities, and was also awarded National Merit Scholarship. He was conferred “ASEI-NCC Emerging Technologist Award” by ASEI (American Society of Engineers of Indian origin) in 1997, conferred the "Pride of India Gold Award" by International NRI Institute in 2007, "Engineer of the Year" award by ASEI in 2011, “Excellence in Engineering” biennial award from NFIA (National Federation of Indian-American Associations), and was the president of ASEI National Capital Chapter in 2014 & 2015. He has been invited to speak on aerospace subjects by many entities, interviewed on television shows and his articles on space related topics have been published by various newspapers and web portals. He is a Life Member and Associate Fellow of AIAA. He is the first Indian-American member of the Screen Actors Guild (SAG) for Washington-Baltimore region, and is a prolific artist.

I. EXPERIENCE

December 1987 to present: President and Chief Executive Officer of Astrox Corporation, an Aerospace Engineering R & D company. Dr. Kothari is also the Founder and Chairman of Astrox Corp.

Manager and/or Principal Investigator for the following contracts:

1. “HySIDE Analysis of Hypersonic Vehicles with GE TPS”, GE Aviation
2. XS-1 Study and Trades, DARPA through UDRI
3. “Reusable Military Space Launch”, Pentagon SAF/AQR through UDRI

4. “Micro Scale Testing of High Speed Aircraft”, AFRL/RQ.
5. “GRYPHON Conceptual Design Study”, AFRL/RB through UTC.
6. “Two Stage to Orbit Joint System Study”, AFRL/RB through UDRI
7. “Two Stage to Orbit Access-to-Space Options”, work performed for the Chief Scientist of the Air Force, Pentagon.
8. “Vision Vehicles for Fully-reusable Access to Space Technologies”, AFRL/RB.
9. “Hybrid Launch System and RBCC Upper Stage Concept Development and Analysis”, Jackson & Tull, AFRL/PRS..
10. “X-43-C Inward Turning Demonstration Vehicle Design”, ATK-GASL.
11. "Flow Analysis Software Tool - SuperSIDE", US Air Force, Wright-Patterson AFB.
12. "Space Vehicle Technology Institute", NASA Glenn, Subcontract from University of Maryland.
13. "Global Strike Vehicle Study", US Air Force, Edwards AFB.
14. "Inward Turning RBCC SSTO Vehicle Design", NASA Marshall.
15. "Advanced Trans-Atmospheric Vehicle", US Air Force, WPAFB.
16. "Library Support Services ", Program Manager, US Army.
17. "Hypersonic Weapons Technology ", US Navy.
18. "Analytical Evaluation of Hypersonic Vehicles", NASA Langley.
19. "Advanced Space Transportation Technologies", NASA Marshall.
20. “Scientific and Engineering Workstation Procurement II (SEWPII) - System Development Services”, NASA Goddard.
21. "Hypersonic Aircraft Design and Optimization", US Air Force, WPAFB.
22. “Business Process Re-engineering for HRM Office”, USDA.
23. “Business Process Re-engineering for IPA Office”, BMDO.
24. "Dual-Fuel Hypersonic Vehicle Study", McDonnell Douglas Corp.
25. "Conceptual Designs of Hypersonic Vehicles", NASA Langley.
26. "Some Innovative Concepts for Single-Stage-to-Orbit Vehicles", US Air Force.
27. "Computational Optimization of Hypersonic Bodies", US Air Force, Phase II.
28. "Rarefied Gas Flow Effects on Hypersonic Vehicles at Very High Altitudes", US Air Force.
29. "Computational Optimization of Hypersonic Bodies", US Air Force, Phase I.

Jan 1982 to April 1988: Assistant Research Engineer at University of Maryland in the Department of Aerospace Engineering.

Co-Principal Investigator on the following projects:

1. with Pratt & Whitney on TBCC TSTO System Tech Assessment
2. with Edwards Air Force Base on Novel Re-usable Launch Vehicle Systems Design
3. with the Office of Naval Research and the NASP joint programs office on unsteady hypersonic flow calculations in impulse facilities.
4. with the Office of Naval Research on the theoretical and computational aspects of low Reynolds number flows.
5. with NASA Langley on theoretical and computational aspects of hypersonic flows.
6. with NASA Langley on non-equilibrium chemistry flow field calculations over Aero-assisted Orbital Transfer Vehicles.

Dissertation Committees:

Ph.D.: Suresh Menon, Maj. Wayne Hallgren and Capt. Greg Gates

M.S.: Adam Grumett and Joe Harris

Sept 1979 to Aug 1981: Senior Development Engineer in High Energy Laser group at Bell Aerospace Textron on the following projects:

. Principal Fluid Dynamicist on COIL (Chemical Oxygen-Iodine Laser)

. HF space laser triduct modelling, power and gain predictions with ALPHA and BLAZE codes

II. MANAGEMENT AND LEADERSHIP ROLES

- President of American Society of Indian-American Engineers – National Capital Chapter, 2014 and 2015, about 250 member organization. (http://asei-ncc.net)

- Board of Directors, American Society of Indian-American Engineers – USA, 2010 through 2013, about 1000 members. (www.aseiusa.org)
- Organizer and Convener of ASEI annual convention in 2013, their most successful convention, with then NASA Administrator as the Keynoter. About 400 attendees.
- Founder and President of Astrox Corporation since 1987. Manager and PI of over 30 R&D contracts from NASA and DOD
- Director, Lifestyles Track, WHEELS Global Foundation, (http://www.wheelsglobalfoundation.org/board_of_directors)
- President, Indian Students' Association, University of Maryland, 1975-77, about 150 graduate students
- President of High School for 4 years, about 1200 students
- President of Class for all 11 years of schooling, about 40 students each year

III. AWARDS, SCHOLARSHIPS AND EXTRA-CURRICULAR :

- Government of India National Merit Scholar for the entire period of university education in India.
- President of High-school, Vidyamandir, Palanpur, India, of approximately 2000 students for the year 1964-65.
- Class president for every year through all 11 years of schooling.
- Conferred, "The Best Student of School" award for excellence in academics as well as extracurricular activities in school for the year 1962.
- "Troop Leader" for Boy Scouts of India for the years 1963 through 1966.
- President of "Indian Students Association" of University of Maryland for the year 1975-76.
- Vice-Chairman of US-Indian Scientists Organization, Washington D.C. metropolitan area, 1985-87.
- "Who's Who in the East", 23rd edition, 1991-92 and 24th edition, 1993-94.
- "Who's Who among Young Professionals", 1991.
- Member, Screen Actors Guild (SAG/AFTRA), since 1993.
- Conferred "ASEI-NCC Emerging Technologist Award" by ASEI, 1997.
- "Patent Granted: # 6164596, Granted by United States Patent and Trademarks Office, Dec 2000, "Designs of and Methodology for Inward or Outward, and Partially Inward or Outward Turning Flow Hypersonic Air-breathing and Rocket-Based-Combined-Cycle Vehicles".
- Conferred "Pride of India Gold Award" by NRI Institute, 2007.
- Conferred "Engineer of the Year Award" by American Society of Engineers of Indian Origin, 2011
- President ASEI- National Capital Chapter, 2014 & 2015
- Board of Directors, WHEELS Global Foundation, 2016 & 2017
- Board of Directors, Asian American Coalition for Education, 2017 to present
- Conferred "Excellence in Engineering" Biennial Award by National Federation of Indian-American Associations, 2018
- Patent Pending: USSN 16/361,756, United States Patent and Trademarks Office, March 2019, "Rockets Embedded Scramjet Nozzle".

IV. TV/OpEds/Radio

TV/Radio/Podcast interviews:

- Space and Art: Rohit Zaveri's Art Exhibition "Unknown Planet" (Hutheesing Art Gallery, Amdavad, India)
- Future of The Space Travel & Art of Life with A Rocket Scientist Dr. Ajay Kothari (Xpertdale Podcast with U Panchal, Oct 2020)
- Railroad to Moon and Mars: https://www.youtube.com/watch?v=C42Lw7ob6js
- Next Giant Leap for America: https://www.youtube.com/watch?v=aLXqMuLk46A
- Toast to Dr. John D. Anderson on his 80th Birth Day Celebrations https://www.youtube.com/watch?v=0EWqT1LQTIA
- Robust Reusable Rocket Revolution: https://www.youtube.com/watch?v=Do-DFHQAPo0
- Astrox & University of Maryland MIPS Joint Project https://www.youtube.com/watch?v=wIqanFc566w

- Radio: Getting Back to the Moon and Why, China Space Policy: https://www.thespaceshow.com/show/22-dec-2020/broadcast-3621-dr.-ajay-kothari (The Space Show 3621: December 2020)
- Radio: https://thespaceshow.com/show/15-sep-2019/broadcast-3375-dr.-ajay-kothari
- Radio:http://www.thespaceshow.com/show/26-jun-2018/broadcast-3140-dr.-ajay-kothari
- Radio: http://www.thespaceshow.com/show/18-jul-2017/broadcast-2950-dr.-ajay-kothari

OpEds:

- Thor the Lifesaver? https://www.thespacereview.com/article/4243/1 (Space Review: September 2021)
- The case for scrapping the Space Launch System: https://www.thespacereview.com/article/4141/1 (Space Review: March 2021)
- Learning from Chandrayaan 2 for India: https://www.thespacereview.com/article/4084/1 (Space Review: December 2020)
- Reinvigorating NASA's lunar exploration plans after the pandemic: https://www.thespacereview.com/article/3939/1 (Space Review: May 2020)
- https://dailycaller.com/2019/12/02/kothari-trump-space-economy (With Trump's Help, America Can Beat China In The New Space Economy)
- http://www.thespacereview.com/article/3766/1 (Apollo as Viewed from Jungle)
- https://dailycaller.com/2019/07/23/kothari-moon-landing (I Was In The Jungle Last Time We Landed On The Moon — There's No Reason We Can't Do It Again)
- http://www.thespacereview.com/article/3706/1 (Going to Moon in Five Years)
- https://dailycaller.com/2019/04/25/kothari-rokita-moon/ (Going to Moon in Five Years)
- http://www.thespacereview.com/article/3569/1 (Sixpack for Mars)
- http://www.thespacereview.com/article/3374/1 (A Giant Leap for America)
- https://www.indiaabroad.com/special_reports/u-s-and-india-friends-on-earth-allies-in-space/article_31380e04-872d-11e7-82e3-bf0292725bec.html (U.S. and India: Friends on earth, allies in space)
- https://www.americanbazaaronline.com/2017/05/27/human-colony-on-moon-possible-years-425802/ (Human Colony on Moon)
- http://www.thespacereview.com/article/3180/1 (To the Moon, Uncle Sam!)
- http://thespacereview.com/article/2490/1 (Space Transportation)
- http://www.thespacereview.com/article/2490/1 (Robust and Reusable?)
- http://www.thespacereview.com/article/1129/1 (Reassessing Scramjets and Spaceplanes)
- On a multitude of benefits cheaper access-to-space may engender and what would be needed to make that happen viz. the reusable technology development efforts by NASA and DOD: http://www.baltimoresun.com/news/opinion/oped/bs-ed-space-transportation-20120624,0,2203104.story
- On decreased emphasis in the country on creative endeavors in favor of more parasitic ones, which formed the basis of the second OpEd: http://www.baltimoresun.com/news/opinion/oped/bs-ed-rocket-science-20120917,0,2562871.story

V. EDUCATION

PhD, Aerospace Engineering, University of Maryland, Aug 1979.
Major field: Aerodynamics and Propulsion
Minor field: Physics
Dissertation topic: "NavierStokes Solutions for Chemical Laser Flows - Steady and Unsteady Flows"

MS, Aerospace Engineering, University of Maryland, Aug 1975.
Research paper: "Electric Propulsion - A Review of the Principles and Present State of the Art"

BS, Physics, University of Bombay, June 1971.

VI. PROFESSIONAL PUBLICATIONS

Kothari, A., “A Virtual Railroad to Moon and Mars”, Presented at the National Space & Missile Material Symposium and Commercial & Government Responsive Access to Space Technology Exchange (NSMMS & CRASTE) 2020 Virtual Conference, Rockville, MD, June 2020.

Kothari, A., Moszee R., and Sponable J. “Hypersonic Research Vehicle”, Presented at the National Space & Missile Material Symposium and Commercial & Government Responsive Access to Space Technology Exchange (NSMMS & CRASTE) 2020 Virtual Conference, Rockville, MD, June 2020.

Kothari, A., “Orbital Space Tourism Opportunities Made Available via Reusable Rocket and Hypersonic Architectures”, Presented at the CRASTE 2014 Conference, Huntsville, AL, June 2014.

Kothari, A., and Livingston, “Single Stage to Orbit”, Presented at the CRASTE 2014 Conference, Huntsville, AL, June 2014.

Kothari, A. “Orbital Space Tourism Opportunities Made Available via Reusable Rocket and Hypersonic Architectures”, Presented at 15th Annual FAA Commercial Space Transportation Conference, Panel: A Step Farther Out, Washington DC, 15 - 16 February 2012

Kothari, A., Livingston, J., Tarpley, D. Hood, V., Bowcutt, K., Smith, T., Drayna, T., Dwenger, A., and Jacobsen, L., “Resizing of RBCC TSTO with Incorporation of Level 2 Results”, Presented at the 5th CRASTE Conference, Atlanta, GA, October 2011.

Kothari, A., Livingston, J., Tarpley, C., Raghavan, V., Bowcutt, K., and Smith, T., “Rocket Based Combined Cycle Hypersonic Vehicle Design for Orbital Access”, AIAA paper no. 2011-2338, Presented at the AIAA International Space-planes and Hypersonic Technology Conference, San Francisco, CA, April 2011.

Bowcutt, K., Smith, T., Kothari, A., Raghavan, V, Tarpley, C., and Livingston, J., “The Hypersonic Space and Global Transportation System: A Concept for Routine and Affordable Access to Space”, Presented at the AIAA International Space-planes and Hypersonic Technology Conference, San Francisco, CA, April 2011.

Tarpley, C., Kothari, A., Raghavan, V., and Hellman, B., “Aerodynamic Analysis on the Rocket Based Combined Cycle Hypersonic Vehicle”, Presented at the 4th CRASTE Conference, San Francisco, CA, October 2010.

Kothari, A., Webber, D., “A Possible Route to Large Markets for Orbital Space Tourism by Using Reusable Rocket and Hypersonic Architectures”, Presented at the 4th CRASTE Conference, San Francisco, CA, October 2010.

Kothari, A., Livingston, J., Tarpley, C., Raghavan, V., Bowcutt, K., Smith, T. and Hellman, B., “A Reusable, Rocket and Airbreathing Combined Cycle Hypersonic Vehicle Design for Access-to-Space”, Presented at the AIAA Space 2010 Conference, Anaheim, CA, August 2010.

Kothari, A., Webber, D., “A Possible Route to Large Markets for Orbital Space Tourism by Using Reusable Rocket and Hypersonic Architectures”, Presented at the AIAA Space 2010 Conference, Anaheim, CA, August 2010.

Kothari, A., “Dual Flowpath Inward Turning RBCC Design as Second Stage of Fully Reusable TSTO System”, Presented at the 3rd CRASTE Conference, Dayton, OH, October 2009.

Kothari, A., “Future Responsive Access to Space Technologies Vision Vehicles Study – 18 Options”, Presented at the 3rd CRASTE Conference, Dayton, OH, October 2009.

Kothari, A., “Technology Uncertainty Impact on Fully Reusable Launch Vehicle Systems”, Presented at the 2nd RASTE Conference, Dayton, OH, May 2008.

Dissel, A., Kothari, A., Livingston, J., and Lewis, M., “Weight Growth Study of Reusable Launch Vehicle Systems”, Journal of Spacecraft and Rockets, AIAA, Vol. 44, No. 3, May-June 2007, pp. 640-648.

Kothari, A., V. Raghavan, and C. Tarpley, “RBCC Upper Stage Modeling for Refueled FASST Concept”, Presented at the 54th JANNAF Propulsion Meeting, Denver, CO, May 2007.

R. Balar, K. Yu, Kothari, A., and A. Gupta, “Pylon- Aided Fuel Injection into Supersonic Flow”, AIAA-2007-0834, presented at 45th AIAA Aerospace Sciences Conference, Jan 2007

Balar, R., Young, G., Pang, B., Gupta, A., Kothari, A., and Yu, K.), “Comparison of Parallel and Normal Fuel Injection in a Supersonic Combustor ”, AIAA paper no. 2006-4442, presented at the 42nd AIAA/SAE/ASME/ASEE Joint Propulsion Conference, July 2006.

Dissel, A., Kothari, A., and Lewis, M., “Investigation of Two-Stage-to-Orbit Air-Breathing Launch Vehicle Configurations”, Journal of Spacecraft and Rockets, AIAA, Vol. 43, No. 3, May-June 2006, pp. 568-574.

Dissel, A., Kothari, A., and Lewis, M., “Comparison of Horizontally and Vertically Launched Air-breathing and Rocket Vehicles”, Journal of Spacecraft and Rockets, AIAA, Vol. 43, No. 1, Jan-Feb 2006, pp. 161-169 .

Young, G., Balar, R., Gupta, A., Kothari, A., and Yu, K., “Characterization of Scramjet Combustor with Transverse Fuel Injection”, AIAA paper no. 2006-1377, presented at the AIAA Aerospace Sciences Conference, Reno, Nevada, Jan 2006.

Dissel, A., Kothari, A., and Lewis, M., “Weight Growth Study of Reusable Launch Vehicle Systems”, AIAA paper no. 2005-4369, presented at the 41st AIAA/SAE/ASME/ASEE Joint Propulsion Conference, July 2005. Accepted for publication by the Journal of Spacecraft and Rockets, AIAA.

Dissel, A., Kothari, A., Raghavan, V., and Lewis, M.), “System Analysis of Launch Transportation Options for Crew Exploration Vehicle”, AIAA paper no. 2005-4366, presented at the 41st AIAA/SAE/ASME/ASEE Joint Propulsion Conference, July 2005.

Kothari, A., Livingston, J. W., and Moszee, R. H.), “Reusable Rocket Based Combined Cycle Upper Stage for Operationally Responsive Spacelift” , Presented at the 2005 JANNAF 40th CS, 28th APS, 22nd PSHS and 4th MSS Meeting, Charleston, SC, June 2005.

Dissel, A. Kothari, A., and Lewis, M.), “Investigation of Two-Stage-to-Orbit Air-Breathing Launch Vehicle Configurations”, AIAA-2005-3244, AIAA/CIRA International Hypersonic and Spaceplane Conference, AIAA/CIRA, Capua, Italy, May 2005.

Dissel, A., Kothari, A., Raghavan, V. and Lewis, M.), “Comparison of HTHL and VTHL Air-breathing and Rocket Systems for Access to Space”, AIAA paper no. 2004-3988, presented at the 40th AIAA/SAE/ASME/ASEE Joint Propulsion Conference, July 2004.

Tarpley, C. and Kothari, A.,, “Effect of Trimmed Flight on Inward-Turning SSTO RLV GTOW,” at the AIAA 7th International Space Planes and Hypersonic Systems and Technologies Conference, AIAA Paper 2003-6995, Norfolk, Virginia, December 2003.

Kothari, A., Moszee, R. H., Drake, R., and Billig, F. S.), “Advanced CAV Delivery System” , Presented at the 2002 JANNAF Propulsion Meeting, Lake Buena Vista, Florida, Nov 2002.

Kothari, A., Tarpley, C., Raghavan, V., and Livingston, J. W.), “Synthesis of RLV Vehicles Using HySIDE (Hypersonic System Integrated Design Environment)” , Presented at the 2002 JANNAF Propulsion Meeting, Lake Buena Vista, Florida, Nov 2002.

Tarpley, C., Kothari, A., Raghavan, V., and Livingston, J. W.), “Comparison of Inward and 2D SSTO/TSTO and HTHL/VTHL Vehicles for Access-to-Space”, Presented at the 2002 JANNAF Propulsion Meeting, Lake Buena Vista, Florida, Nov 2002.

Takashima, N. and Kothari, A., “Euler Calculations at Off-design Conditions for an Inward Turning RBCC-SSTO Vehicle,” Presented at the 1998 JANNAF Propulsion Meeting, Cleveland, OH, July 1998.

(with Tarpley, C., Petley, D., and Raghavan, V.), “Engine Off-Design Performance Results Using SRGULL for an Inward Turning RBCC-SSTO Vehicle,” Presented at the 1998 JANNAF Propulsion Meeting, Cleveland, OH, July 1998.

(with Tarpley, C., and Pines D.), “ Low Speed Stability Analysis of the Dual Fuel Waverider

Configuration“, AIAA 7th International Space Planes and Hypersonic Systems and Technologies Conference, AIAA Paper 96-4596, Norfolk, VA, November 1996.

(with Tarpley, C., McLaughlin, T. A., Babu, B. S. and Livingston J.), “Hypersonic Vehicle Design Using Inward Turning Flowfields”, AIAA paper no. 96-2552, presented at the 32nd AIAA/SAE/ASME/ASEE Joint Propulsion Conference, July 1996.

(with Tarpley, C. and Lewis, M. J.), " Radiation Safety Issues in Single-Stage-To-Orbit Spacecraft Powered by Antimatter Rocket Engines", Journal of Propulsion and Power, Vol. 8, No. 1, Jan-Feb 1992, pp. 127-135.

(with Anderson J., Lewis M. J. and Corda S.), "Hypersonic Waveriders for Planetary Atmospheres," Journal of Spacecraft and Rockets, Vol. 28, no 4, July-Aug 1991, pp. 401-410.

(with Bowcutt, K. G.), " Leading Edge Optimization for Hypersonic Vehicles", Astrox Corporation, presented at the First International Hypersonic Waverider Symposium, Univ. of Maryland, College Park, MD, Oct 1990.

(with Lewis, M.), " Hypersonic Waveriders for Planetary Maneuvering", presented at the First International Hypersonic Waverider Symposium, Univ. of Maryland, College Park, MD, Oct 1990.

(with Lewis M.), " Space Propulsion Benefits with Hypersonic Aerogravity Maneuvering", AIAA paper no. 90-2368, presented at the 26th AIAA/SAE/ASME/ASEE Joint Propulsion Conference, July 1990.

(with Tarpley K. and Lewis M. J.), " Some Safety Concerns for Single Stage to Orbit Antimatter Propulsion", AIAA paper no. 90-2365, 26th AIAA/SAE/ASME/ASEE Joint Propulsion Conference, July 1990.

(with Anderson J., Lewis M. J. and Corda S.), "Hypersonic Waveriders for Planetary Atmospheres," AIAA paper no. 90-0538, AIAA 28th Aerospace Sciences Meeting, Jan 1990.

(with Byun Y., Lee J. Y. and Anderson J.), "Unsteady Hypersonic Viscous Flows in Impulse Facilities", AIAA paper no. 90-0421, AIAA 28th Aerospace Sciences Meeting, Jan 1990.

(with Lewis M.), "The use of Hypersonic Waveriders for Planetary Atmospheres", presented at joint AIAA/JPL conference on Solar System Exploration, July 1989.

(with Anderson, J. D., Jr.), "Low Reynolds Number Effects on Compressibility Correction", Journal of Aircraft, Vol. 24, No. 8, Aug 1987.

(with Anderson J. D.), "Computational Study of Flow over Miley and Wortmann Airfoils". Presented at the Conference on Low Reynolds Number Airfoil Aerodynamics, University of Notre Dame, June 1985.

(with Anderson J. D.), "Flows over Low Reynolds Number Airfoils - Compressible Navier Stokes Solutions", AIAA paper 85-0107, AIAA 23rd Aerospace Sciences Meeting, Jan 1985.

(with Anderson J. D. and Jones E.), "Navier Stokes Solutions for Chemical Laser Flows: Steady and Unsteady Flows", AIAA paper 79-0009, AIAA 17th Aerospace Sciences Meeting, Jan 1979.

(with Anderson J. D. and Jones E.), "Navier Stokes Solutions for Chemical Laser Flows", AIAA Journal, Vol. 15, No. 1, Jan 1977, pp. 92-100.

(with Anderson J. D.), "Navier Stokes solutions for Chemical Laser Flows: Cold Flows", AIAA Journal, Vol. 14, No. 5, May 1976, pp. 702-703.

VII. PERSONAL

Citizenship of the United States of America.
Associate Fellow, AIAA.
Lifetime Senior Member, AIAA.