

## 13 PERSONAL DATA

NAME: H. A. Hassan

DEPARTMENT: Mechanical and Aerospace Engineering, North Carolina State University,  
Raleigh, North Carolina 27695-7910

ACADEMIC RANK: Professor

### EDUCATIONAL RECORD:

B.Sc., (Special) in Mathematics, University of London, England, 1952  
M.S., in Aeronautical Engineering, University of Illinois, Aug. 1953  
Ph.D., in Aeronautical Engineering, University of Illinois, Feb. 1956

### PROFESSIONAL RECORD:

University of Illinois, Urbana, Illinois, Sept. 1953-Feb. 1955, Research Associate  
University of Illinois, Urbana, Illinois, Sept. 1955-Aug. 1956, Instructor  
University of Baghdad, Baghdad, Iraq, Oct. 1956-Aug. 1959, Senior Lecturer  
Virginia Polytechnic Institute, Blacksburg, Virginia, Sept. 1959-June 1961, Associate  
Professor  
Virginia Polytechnic Institute, Blacksburg, Virginia, June 1961-July 1962, Professor  
Douglas Aircraft Company, Charlotte, N. C., June 1961-July 1961, Aerodynamics Engineer  
"A"  
NASA, Langley Research Center, Langley Field, Virginia, June 1962-June 1962, Aerospace  
Technologist  
North Carolina State University, July 1962-Present, Professor  
Douglas Aircraft Company, Charlotte, N. C., Consultant (1962-64)  
Kauman Nuclear, Colorado Springs, Colorado, Consultant (1963-64)  
Research Triangle Institute, Durham, N. C., Consultant (1964-65)  
NASA, Langley Research Center, Langley Field, Virginia, Occasional Consultant (1961-  
present)  
Defense Atomic Support Agency, Washington, D. C., Consultant (1970-71)  
Forge Aerospace, Inc., Washington, D. C., Consultant (1973)  
NASA Langley Research Center, Summers, 1979-1994.

### RESEARCH EXPERIENCE:

- I. Publications (See Attached Sheets)
- II. Supervision of Research Grants:
  - A. Principal Investigator
    1. NASA Grant NSG-363, dealing with nonequilibrium ionization in the presence of electric and magnetic fields (Feb. 1963-June 1967)

2. NASA Grant NRG 34-002-027, dealing with study of liquid injection into the shock layer of a reentry vehicle (Sept. 1965-Aug. 1967)
3. NASA Grant NGR 34-002-048, dealing with plasma surface interactions (Feb. 1967-Jan. 1970)
4. NASA Grant NGR 34-002-115, dealing with CO<sub>2</sub> electric discharge lasers (Sept. 1969-Aug. 1972)
5. NASA Grant NGR 34-002-117, dealing with Nuclear Induced Plasmas (March 1972-December 1974)
6. NSF Grant GK-41610, dealing with high flow electric discharge CO laser systems (February 1974-July 1975)
7. NASA Grant NSG 1013, dealing with modeling of slow flow electric discharge CO laser system (April 1974-December 1975)
8. DOT Grant DOS-OS-40056, dealing with combustion generated noise (May 1974-June 1981)
9. NASA Grant NSG 1058, dealing with nuclear pumped lasers (July 1974-June 1981)
10. NASA Cooperative Agreement NCC1-22, dealing with computational fluid dynamics (June 1979-September 1995)
11. NASA Cooperative Agreement NCC1-54, dealing with Solar Pumped Lasers (July 1981-December 1982)
12. NASA Grant NAG-1-244, dealing with Numerical Solutions of the Complete Navier-Stokes Equations (January 1982-September 1997)
13. NASA Grant NGT 34-002-8000 dealing with Solutions of the Time Dependent Euler Equations (June 1983-August 1985)
14. NASA Cooperative Agreement NCC1-84 dealing with Physics of Aircraft Wakes (May 1984-December 1986)
15. NASA Grant NGT 34-002-8001 dealing with Wind Tunnel Wall Interference Effects (May 1985-December 1987)
16. NASA Cooperative Agreement NCC1-112 dealing with Study of the Transitional Flow Regime Using Monte Carlo Methods (March 15, 1987 to October 30, 1998)

17. NASA Grant NAG-1-1876 dealing with A New Approach for Determining Onset of Transition (November 1, 1996 to October 31, 1997)
18. NASA Grant NGT-1-52154 dealing with a Study of Compressible Turbulence (January 1, 1997 to December 31, 1997)
19. NASA Grant NGT-1-52177 dealing with Transition Prediction for High Speed Flow (September 3, 1997 to September 2, 1999)
20. NIA GRA Dealing with Study of Heating Environment of Vehicles at High Speed, (August 15, 2005 to August 14, 2007)
21. NASA Cooperative Agreement NNX08AH07A dealing with Radiative Heating Environment During Planetary Entry, (Feb.6, 2008 to Feb.5, 2010)
22. NASA Grant NNX09AM21H dealing with Nonequilibrium Ablation, (Sept. 1, 2009 to Aug. 31, 2011)

#### B. Co-Principal Investigator

1. NASA Grant NAGW-1072 dealing with Hypersonic Aerodynamics (May 1987-May 1992)
2. NASA Grant NAGW-1331 dealing with Mars Mission Research (July 1988-June 1996)
3. NASA Grant NAG1-1991 dealing with Study of High Lift Configurations (Jan 12, 1998 to Jan 11, 2000) (with J. R. Edwards)
4. Sandia National Laboratories, Grant BF-856 and Grant A0350 dealing with Transition/Turbulence Modeling of Hypersonic Flows (Feb. 1999-Oct. 2003) (with J. R. Edwards)
5. Taitech, Inc (SBIR Phase II from Air Force Research Lab) dealing with Development of Hybrid LES/URANS Models for Simulating Cavity Flameholder Configurations (May 2000-April 2002) (with J. R. Edwards)
6. Army Research Lab Contract TCN 02133 dealing with Dynamically Resolved Simulation of Atmospheric Turbulence Using Advanced Turbulence Models and Adaptive Algorithms ( July 2002-July 2004) ( with D. S. McRae)
7. NASA Grant NAG-1-030300 dealing with Modeling Turbulence Combustion for Variable Prandtl and Schmidt Numbers (April 2003-August 2004) (with J. R. Edwards)

8. NASA Contract NNL04AA3C dealing with Wing Shape Adaptation using Multiple Flaps for Drag Reduction and Structural Load Alleviation (January 2004-July 2004) ( with A. Gopalarathnam)
9. Air Force Contract FA8718-04-C-0019 Dealing with Dynamically Resolved Simulation of Atmospheric Features and Turbulence using Advanced Models and Adaptive Algorithms ( June 2004-Sept 2008) ( with D. S. McRae)
10. Air Force Contract FA9109-04-C-0015 dealing with Improved Modeling of the Turbulent Diffusion of Thermal Energy and of Chemical Species in Turbulent, Chemically-Reacting Flow-Field CFD Calculation (August 2004-December 2007) (with X. Xiao)
11. NIA Contract dealing with Development of a High Resolution Mesoscale Model for Mars, May 2005 to December 2008. (with D. S. McRae and X. Xiao).
12. Subcontract to Colorado Research Associates dealing with New Approaches for Forecast of Optical Turbulence, February 2006 to August 2006, (with D. S. McRae and X. Xiao).
13. Subcontract to North West Research Associates dealing with High-Resolution Simulation of Atmospheric Turbulence, April 2007-March 2010, (with D. S. McRae)
14. Subcontract to University of Virginia National Center for Hypersonic Combined Cycle Propulsion, August 2009-July 2014, (with J. R. Edwards)

#### EXPERIENCE IN SUPERVISION OF GRADUATE STUDY:

Supervised sixty eight Master's theses and thirty four Ph.D. Dissertations.

#### PROFESSIONAL AND HONORARY SOCIETIES:

American Institute of Aeronautics and Astronautics (Fellow)  
Sigma Xi  
Sigma Gamma Tau  
Pi Tau Sigma  
Phi Kappa Phi

#### SERVICE ON NATIONAL ORGANIZATIONS AND COMMITTEES:

Vice Chairman, AIAA Carolina Sections 1970-1971  
Chairman, AIAA Carolina Section 1971-1972, 1981-1983, 1994-1996  
Secretary, AIAA Carolina Section, 1983-1986  
Western Electric Fund Award Committee (ASEE, Member 1975, Chairman 1976)  
AIAA Technical Committee on Plasmadynamics, 1979-1981  
Chairman, AIAA Fluid and Plasmadynamics Award Selection Committee, 1979

Member AIAA Thermophysics Technical Committee, 1991-1994  
Acting Chairman, AIAA Carolina Section, 1991-1992  
Chairman, AIAA Thermophysics Award Subcommittee, 1993  
Technical Chair, 6th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, June 1994  
Member, AIAA Propellants and Combustion Technical Committee, 1994-1997  
Member, AIAA Fluid Dynamics Technical Committee, 1997-2003.  
Chair, AIAA Fluid Dynamics Awards Subcommittee, 1997-1998  
Technical Chair, 15<sup>th</sup> AIAA Computational Fluid Dynamics Conference, June 2001  
Chair, AIAA FDTC CFD Subcommittee, 2001-3003.  
Member, AIAA Atmospheric and Space Environment Technical Committee, 2003-2008  
Lead Instructor, AIAA short course on“ Stability and Transition: Theory, Modeling, and Applications,” June 21-22, 2003, Orlando, FL., June 3-4, 2006, San Francisco, CA, June 26-27, 2008, Seattle, WA, June 26-27, 2010, Chicago, IL.  
Member, AIAA Fellow Peer Review Committee, 2007  
Member, AIAA Fellow Selection Committee, 2008  
Member, AIAA High Speed Air Breathing Propulsion Technical Committee, 2009-  
Member, AIAA Fellow Peer Review Committee, 2010  
Technical Chair, High Speed Air Breathing Propulsion, Aerospace Sciences Meeting, January 2011.

#### BIOGRAPHICAL LISTINGS:

American Men and Women of Science  
Who's Who in the South and Southwest  
Who's Who in Aviation

#### HONORS AND AWARDS:

Fulbright Scholarship, 1952-53, to study at University of Illinois, Urbana, Illinois  
Sigma Xi Research Award, 1966  
University of Illinois Distinguished Alumnus Award, 1974  
ASEE Western Electric Fund Award, 1974  
Pi Tau Sigma - ASME Charles Russ Richards Award, 1977  
Alcoa Foundation Distinguished Engineering Research Award, 1987  
Alumni Distinguished Graduate Professor, 1991  
NASA Public Service Medal, 1992  
R. J. Reynolds Co. Award for Excellence in Teaching, Research, and Extension, 1993.  
AIAA Thermophysics Award, 1999  
The Alexander Holladay Medal For Excellence, 2004. This is the highest honor bestowed on a Faculty member by the trustees of North Carolina State University.  
AIAA Fellow, 2006  
AIAA Sustained Service Award, 2007.

DATE OF BIRTH:

MARITAL STATUS:

February 26, 1931

Married with two children

CITIZENSHIP:

U.S.A.

## PUBLICATIONS OF DR. H. A. HASSAN

1. "Thermal Stresses Due to Steady-State Axial Temperature Distributions in Thin Cylinders with Temperature-Dependent Viscoelastic Properties of the Kelvin, Maxwell and Standard Linear Solid Type," Report No. TSVE=TR-5 on Contract No. Af 33(610)-291, 1953.
2. "Thermal Stresses in Circular Plates with Viscoelastic Temperature Dependent Properties of the Kelvin and Standard Linear Solid Type," Harry H. Hilton and H. A. Hassan, Report No. ISVE-TR-4 on Contract No. AF 33(616)-291, 1953.
3. "Analytical Studies of Thermal Studies in Media Possessing Temperature-Dependent Viscoelastic Properties," Harry H. Hilton, H. A. Hassan and H. G. Russel, WADC Technical Report 53-322, 1953.
4. "Compressible Mixing of Two Parallel Streams," T. P. Torda and H. A. Hassan, Report No. M-TR-8 on Contract No. AF 33(038)-21251, 1954.
5. "Laminar Compressible Flow Through Turbomachines with Finite Blade Spacing," Report No. C-TM-1 on Contract No. AF 33(616)-52, 1955.
6. "The Plastic Bending of Tapered Members," M. C. Steele, and H. A. Hassan, WADC Technical Report, Contract No. AF 33(616)-2753, 1956.
7. "Generalization of Bergman's Linear Integral Operator Method to Diabatic Flow," M. Z. v. Krzywoblocki and H. A. Hassan, *J. Soc. Indus. App. Math.*, Vol. 8, No. 2, 1957.
8. "On the Limiting Lines in Diabatic Flow," M. Z. v. Krzywoblocki and H. A. Hassan, *Commentarii Mathematici Universitatis Sancti Pauli*, Vol. 5, No. 2, 1957.
9. "Some Aspects of Three-Dimensional Diabatic Flow," *Proceedings of the Iraqi Scientific Societies*, Vol. 2, pp. 11-14, 1959.
10. "On Heat Transfer to Laminar Boundary Layers," *Journal of Aerospace Sciences*, Vol. 26, No. 7, p. 464, 1959.
11. "On a Solution to the Unsteady Laminar Boundary Layer," *Journal of Aerospace Sciences*, Vol. 27, No. 6, pp. 474-476, 1960.
12. "On Unsteady Laminar Boundary Layers," *Journal of Fluid Mechanics*, Vol. 9, Part 2, pp. 300-304, 1960.
13. "On Skin Friction in the Slip Flow Regime," *Journal of Aerospace Sciences*, Vol. 28, No. 4, pp. 335-335, 1961.
14. "On Laminar Flow of an Ideal Dissociating Gas," *Development in Mechanics*, Vol. 1, (J. E. Lay and L. E. Malvern, Editors), Plenum Press, New York, pp. 409-416, 1961.

15. "Bremsstrahlung Effects on Specific Impulse in Electrothermal Propulsion Devices," *Journal of Aerospace Sciences*, Vol. 29, No. 8, pp. 1005-1006, 1962.
16. "On the Flow of a Highly Conducting Plasma in a Converging-Diverging Nozzle," *American Rocket Society Journal*, Vol. 32, No. 10, pp. 1610-1612, 1962.
17. "Nonequilibrium Ionization in Steady Discharges Crossed with Magnetic Fields for High Pressure MHD Studies, II, Theory," H. A. Hassan, W. Grossmann and R. V. Hess, *APS Bulletin*, Sec. II, Vol. 9, No. 3, p. 313, 1964.
18. "On the exact Solution of Gas-Particle Nozzle Flows," *AIAA Journal*, Vol. 2, pp. 295-396, 1964.
19. "On the Stress Tensor of a Partially Ionized Gas in the Presence of Electric and Magnetic Fields," *Plasma Physics - Accelerators - Thermonuclear Research, Journal of Nuclear Energy*, Part C., Vol. 6, pp. 289-293, 1964.
20. "On the Transport Properties of a Partially Ionized Gas in the Presence of Electric and Magnetic Fields," NASA TN D-2369, July 1964.
21. "Experiments with a Coaxial Hall Current Plasma Accelerator," W. Grossman, R. V. Hess and H. A. Hassan, AIAA Paper No. 64-700, AIAA Fourth Electric Propulsion Conference, Aug. 1964, also, *AIAA Journal*, Vol. 3, No. 6, pp. 1034-1039, 1965.
22. "Excessive Ion Energies for Steady Discharges in Magnetic Fields," R. V. Hess and H. A. Hassan, *Bull. Am. Phys. Soc.*, Vol. 10, p. 225, 1965.
23. "Experiments and Analysis for Coaxial Hall Current Accelerators and Role of Ionization Effects," H. A. Hassan, R. V. Hess and W. Grossmann, P. Brockman and G. Oertel, Sixth Symposium on Engineering Aspects of MHD, April 21-22, 1965.
24. "Experiments with a Coaxial Hall Current Plasma Accelerator," W. Grossman, R. V. Hess, and H. A. Hassan, *AIAA Journal*, Vol. 3, No. 6, pp. 1034-1039, 1965.
25. Comment on "Rocket Motor with Electric Acceleration in the Throat," *Journal of Spacecraft and Rockets*, Vol. 2, No. 6, p. 1013, 1965.
26. "Analysis of Gas-Particle Flows in Rocket Nozzles," T. C. Dellinger and H. A. Hassan, *Journal of Spacecraft and Rockets*, Vol. 3, No. 4, pp. 601-603, 1966.
27. "Anode Losses in Coaxial Hall Current Acceleration," H. A. Hassan and G. W. Garrison, Jr., AIAA Paper No. 66-201, AIAA Fifth Electric Propulsion Conference, March, 1966, also, *AIAA Journal*, Vol. 5, No. 5, pp. 840-843, May 1967.



28. "Nongrey Radiation Effects on the Boundary Layer of an Absorbing Gas Over a Flat Plate," A. M. Smith and H. A. Hassan, NASA CR-576, September 1966.
29. "Study of Coaxial Hall Current Accelerators at Moderate Pressures," H. A. Hassan, R. V. Hess, and William Grossmann, Jr., NASA TN D-3286, October 1966.
30. "Nongrey Radiation Effects on the Hypersonic Boundary Layer Over a Flat Plate," A. M. Smith and H. A. Hassan, *AIAA Journal*, Vol. 4, No. 10, pp. 1840-1842, October 1966.
31. "Characteristics of a Rotating Plasma," *Phys. of Fluids*, Vol. 9, No. 10, pp. 2077-2078, October 1966.
32. "Nongrey Radiation Effects on the Boundary Layer at Low Eckert Numbers," A. M. Smith and H. A. Hassan, ASME Paper 66-WA/HT-35, Winter Annual Meeting, January 1967, also, *AIAA Journal*, Vol. 5, No. 12, pp. 2228-2231, December 1967.
33. "Study of Instabilities in Linear Hall Current Accelerators," G. W. Garrison, Jr., H. A. Hassan and R. K. Seals, Jr., NASA CR-676, January 1967.
34. "Potential and Current Distribution in MPD Arcs," by R. L. Coleman, H. A. Hassan and B. H. Garcia, Jr., AIAA Paper No. 67-48, AIAA Fifth Aerospace Science Meeting, January 1967, also, *AIAA Journal*, Vol. 5, No. 12, pp. 228-231, December 1967.
35. "Thrust from an MPD Arcjet," *AIAA Journal*, Vol. 5, No. 2, pp. 338-339, 1967.
36. "Screw Instability in Linear Hall Accelerators," G. W. Garrison, Jr., and H. A. Hassan, *Phys. of Fluids*, Vol. 10, No. 4, pp. 711-718, April 1967.
37. "Analysis of MPD Arcs with Nonequilibrium Ionization," R. K. Seals, Jr., and H. A. Hassan, AIAA Paper No. 68-67, January 1968, also, *AIAA Journal*, Vol. 6, No. 12, pp. 2273-2278, December 1968.
38. "Drift Velocities and Thermal Flux Vectors in a Seeded Plasma with Magnetic Fields," H. A. Hassan, *The Physics of Fluids*, Vol. 11, No. 1, pp. 106-111, January 1968.
39. "Theoretical Investigation of Liquid Water Injection into the Shock Layer of Reentry Vehicle," T. C. Dellinger and H. A. Hassan, NASA CR-66567, 1968.
40. "Surface Effects on the Structure of a Collisionless Sheath Near an Electrode," H. A. Hassan, *The Physics of Fluids*, Vol. 11, No. 5, pp. 1085-1091, May 1968.
41. "Parametric Study of Sheath-Boundary Interactions," H. A. Hassan and P. W. McDonald, *The Physics of Fluids*, Vol. 11, No. 12, pp. 2775-2777, December 1968.

42. "Influence of Surface Parameters on Anode Losses in Arcjets," H. A. Hassan and Neill S. Smith, AIAA Paper 69-107, January 1969, also, *AIAA Journal*, Vol. 8, No. 4, pp. 657-661, April 1970.
43. "Onset of Instabilities in Coaxial Hall Current Accelerators," H. A. Hassan and Charles C. Thompson, AIAA Paper 69-230, March 1969, also, *AIAA Journal*, Vol. 7, No. 12, pp. 2300-2304, December 1969.
44. "A Criterion for Electrode Erosion on Entrainment in MPD Arcs," *Energy Conversion*, Vol. 9, No. 4, pp. 157-158, December 1969.
45. "Quasi-Ambipolar Diffusion in Arc Discharges in a Magnetic Field," H. A. Hassan and C. C. Thompson, *Plasma Physics*, Vol. 12, No. 11, pp. 727-736, October 1970.
46. "Analysis of an Electric Discharge CO<sub>2</sub> Mixing Laser," H. A. Hassan and J. W. Bordeaux, AIAA Paper 71-66, January 1971, also, *AIAA Journal*, Vol. 10, No.4, pp. 414-419, April 1972.
47. "Collisionless Sheath Near an Electrode in the Presence of a Magnetic Field," H. A. Hassan and R. K. Seals, Jr., *The Physics of Fluids*, Vol. 14, No. 2, pp. 344-348, February 1971.
48. "Thrust from Arcjets with Self Induced Magnetic Fields," *AIAA Journal*, Vol. 9, No. 4, pp. 578-581, April 1971.
49. "Theory and Experiment of Electric Discharge CO<sub>2</sub> Convection Lasers," R. K. Seals, Jr., F. Allario, R. A. Lucht and H. A. Hassan, AIAA Paper 71-588, June 1971, also, *AIAA Journal*, Vol. 10, No. 4, pp. 269-370, April 1972.
50. "Sheath Structure in a Plasma Diode in the Presence of Collisions, Ionization and Reflections," S. M. Chu and H. A. Hassan, *Eighth International Symposium on Rarefied Gas Dynamics*, Vol. 2, pp. 557-562, July 1972.
51. "Thermodynamic Properties of UF<sub>6</sub> at High Temperatures," H. A. Hassan and Jerry E. Deese, NASA CR-2372, 1974.
52. "Analysis of High-Flow Electric Discharge CO Laser Systems," N. S. Smith, H. A. Hassan and R. M. McInville, AIAA Paper 74-180, January 1974.
53. "Scaling of Combustion - Generated Noise," *Journal of Fluid Mechanics*, Vol. 63, Part 3, pp. 445-454, November 1974.
54. "Small Signal Gain Calculations for High Flow CO Electric Discharge Lasers," N. S. Smith, H. A. Hassan and R. M. McInville, *AIAA Journal*, Vol. 12, pp. 1619-1620, December 1974.

55. "Power Calculations for High Flow CO Discharge Laser Systems," N. S. Smith and H. A. Hassan, AIAA Paper 75-35, January 1975; also, *AIAA Journal*, Vol. 14, No. 3, pp. 374-381, March 1976.
56. "Noise Generation and Transmission in Duct Combustors," David W. Lindley and H. A. Hassan, AIAA Paper 75-527, March 1975; also, *Progress in Aeronautics and Astronautics Aeroacoustics: Jet Noise, Combustion and Core Engine Noise*, Vol. 43, edited by I. R. Schwartz, H. T. Nagmatou and W. C. Strahle, AIAA, New York, 1976, pp. 579-588.
57. "Theory and Experiment of Low Transitions in CO Discharge Lasers," B. Sidney, R. M. McInville and H. A. Hassan, AIAA Paper No. 75-850, 1975; also, *AIAA Journal*, Vol. 14, No. 7, pp. 923-929, July 1976.
58. "Theory of Low Transitions in CO Discharge Lasers," B. D. Sidney, R. M. McInville, Neill S. Smith and H. A. Hassan, NASA TN-D8181, April 1976.
59. "The Electron Boltzmann Equation in a Plasma Generated by Fission Fragments," H. A. Hassan and Jerry E. Deese, NASA CR 2712, 1976.
60. "Analysis of Nuclear Induced Plasmas," J. E. Deese and H. A. Hassan, *AIAA Journal*, Vol. 14, No. 11, pp. 1589-1597, November 1976.
61. "Electron Distribution Function in a Plasma Generated by Fission Fragment," H. A. Hassan and J. E. Deese, *The Physics of Fluids*, Vol. 19, No. 12, pp. 2005-2011, December 1976. See also *The Physics of Fluids*, Vol. 20, No. 9, p. 1586, September 1977.
62. "Interaction of Fission Fragments with Gases," Jerry E. Deese and H. A. Hassan, *ANS Transactions*, Vol. 26, pp. 528-529, June 1977.
63. "The Spectrum of Combustion-Generated Noise," J. Stephenson and H. A. Hassan, *Journal of Sound and Vibration*, Vol. 53, No. 2, p. 283-299, 1977.
64. "Direct Nuclear Pumping by a Volume Source of Fission Fragments," J. E. Deese and H. A. Hassan, AIAA Paper 78-69, January 1978; also, *AIAA Journal*, Vol. 16, No 1978, pp. 1030-1034.
65. "Distribution Functions in Plasmas Generated by a Volume Source of Fissions Fragments," J. E. Deese and H. A. Hassan, *The Physics of Fluids*, Vol. 22, No. 2, Feb. 1979, pp. 257-262.
66. "Theory of Nuclear Pumped Noble Gas Lasers and Comparisons with Experiment," J. E. Deese and H. A. Hassan, in *Proceedings of First International Symposium on Nuclear Induced Plasmas and Nuclear Pumped Plasmas*, edited by M. Fitaire, Lee Editions de Physique, Orsay, France, 1979, pp. 53-65.

67. "Electron Distribution Functions in Nuclear Pumped Lasers," H. A. Hassan and J. E. Deese, in *Proceedings of First International Symposium on Nuclear Induced Plasmas*, edited by M. Fitaire, Les Editions de Physique, Orsay, France, 1979, pp. 103-119.
68. "Kinetics of a CO<sub>2</sub> Nuclear Pumped Laser," AIAA Paper 79-1566, July 1979; also, *AIAA Journal*, Vol. 18, No. 10, Oct. 1980, pp. 1221-1222.
69. "Nuclear Pumping by the <sup>235</sup>U (n,ff) FF Reaction," AIAA Paper 80-0095, January 1980.
70. "UF<sub>6</sub> - Pumped Laser System," *ANS Transaction*, Vol. 34, 811-812, June 1980.
71. "Analysis of He-N<sub>2</sub>-CO<sub>2</sub>-UF<sub>6</sub> Laser System," AIAA Paper 80-1403, 1980; also *AIAA Journal*, Vol. 19, No. 7, July 1981, pp. 893-898.
72. "Analysis of the UF<sub>6</sub>-Xe Direct Nuclear Pumped Laser," *AIAA Journal*, Vol. 18, No. 12, Dec. 1980, pp. 1490-1494.
73. "Transonic Flow Calculations Using Euler's Equations," H. L. Atkins and H. A. Hassan, AIAA Paper 82-0106, January 1982; also, *AIAA Journal*, Vol. 21, No. 6, June 1983, pp. 842-847.
74. "Conversion of Blackbody Radiation into Laser Energy," R. M. McInville and H. A. Hassan, AIAA Paper 82-0871, June 1982.
75. "Heating Analysis of Bent-Nose Biconics at High Angles of Attack Using the Parabolized Navier-Stokes equations," B. L. Stephenson and H. A. Hassan, AIAA Paper 83-1507, June 1983.
76. "A New Stream Function Formulation for the Euler Equations," H. L. Atkins and H. A. Hassan, AIAA Paper 83-1507, July 1984; Also, *AIAA Journal*, Vol. 23, May 1985, pp. 701-706.
77. "Transonic Flow Calculations Using a Flux Vector Splitting Method for the Euler Equations," C. M. Seaford and H. A. Hassan, AIAA Paper 84-0090, January 1984.
78. "Embedded Shear Layer Computations for Increased Drag Reduction," R. M. McInville, T. B. Gatski and H. A. Hassan, AIAA Paper 84-0349, January 1984.
79. "A Strongly Implicit Procedure for the Compressible Navier-Stokes Equations," R. W. Walters, D. L. Dwoyer and H. A. Hassan, AIAA Paper 84-0424, January 1984; also *AIAA Journal*, Vol. 24, No. 1, pp. 6-12, 1986.
80. "Euler Calculations for Multielement Airfoils Using Cartesian Grids," D. K. Clarke, M. D. Salas and H. A. Hassan, AIAA Paper 85-0291, January 1985; also, *AIAA Journal*, Vol. 24, pp. 353-358, March 1986.

81. "Application of a Variational Scheme for Generating Adaptive Grids," R. I. Kreis, F. C. Thames and H. A. Hassan, AIAA Paper 85-0487, January 1985; also, *AIAA Journal*, Vol. 24, pp. 404-410, March 1986.
82. "Assessment of Wind Tunnel Corrections for Multielement Airfoils at Transonic Speeds," R. L. Gaffney, Jr., M. D. Salas and H. A. Hassan, Third Symposium on the Numerical and Physical Aspects of Aerodynamic Flow, January 1985.
83. "Mixing Layer Control for Tangential Slot Injection in Turbulent Flows," R. M. McInville, W. L. Goodman and H. A. Hassan, AIAA Paper 85-0541, March 1985.
84. "Analysis of Large Vortical Structures in Shear Layers," R. M. McInville, J. B. Gatski and H. A. Hassan, *AIAA Journal*, Vol. 23, August 1985, pp. 1165-1171.
85. "Roll-up of Aircraft Wakes," R. A. Mitcheltree, R. J. Margason and H. A. Hassan, AIAA Paper 86-0078, January, 1986; also, *Journal of Aircraft*, Vol. 23, pp. 650-655, August 1986.
86. "The Efficient Calculation of Chemically Reacting Flows," D. R. Eklund, J. P. Drummond and H. A. Hassan, AIAA Paper 86-0563, January 1986; also, *AIAA Journal*, Vol. 25, pp. 855-856, June 1987.
87. "Unsteady Transonic Flows Past Airfoils Using the Euler Equations," G. E. Smith, Woodrow Whitlow, Jr. and H. A. Hassan, AIAA Paper 86-1764, June 1986; also, *Journal of Aircraft*, Vol. 24, pp. 670-672, September 1987.
88. "Euler Calculations for Wings Using Cartesian Grids," R. L. Gaffney, Jr., M. D. Salas and H. A. Hassan, AIAA Paper 87-0356, January 1987.
89. "Boundary Conditions for the Navier-Stokes Equations," Edgar N. Rudisill, Jr. and H. A. Hassan. In, *Numerical Methods in Laminar and Turbulent Flow*, C. Taylor, W. G. Habashi and M. M. Hafez, Editors, Pineridge Press, Swansea, U.K., Vol. 5, pt., pp. 127-136, 1987.
90. "Unsteady Viscous-Inviscid Interaction Procedures for Transonic Airfoils Using Cartesian Grids," C. C. Fenno, Jr., P. A. Newman, and H. A. Hassan, AIAA Paper 88-2591-CP, June 1988; also, *Journal of Aircraft*, Vol. 26, pp. 723-730, August 1989.
91. "Grid Generation and Adaptation for the Direct Simulation Monte Carlo Method," D. P. Olynick, J. N. Moss and H. A. Hassan, AIAA Paper 88-2734, June 1988; also *Journal of Thermophysics and Heat Transfer*, Vol. 3, pp. 368-373, October 1989.
92. "Grid Embedding Technique Using Cartesian Grids for Euler Solutions," R. A. Mitcheltree, M. D. Salas, and H. A. Hassan, *AIAA Journal*, Vol. 26, pp. 754-756, June 1988.
93. "Navier-Stokes Calculations Using Cartesian Grids: I. Laminar Flows," P. D. Frymier, H. A. Hassan, and M. D. Salas, *AIAA Journal*, Vol. 26, pp. 1181-1188, October 1988.

94. "Influence of Afterbodies on AOTV Flows," D. P. Olynick, J. N. Moss and H. A. Hassan, AIAA Paper 89-0331, January 1989.
95. "Monte Carlo Simulation of Reentry Plasmas," A. B. Carlson, H. A. Hassan, and J. N. Moss, AIAA Paper 89-0683, January 1989.
96. "Study of Hypersonic Flow Past Sharp Cones," J. C. Taylor, J. N. Moss and H. A. Hassan, AIAA Paper 89-1713, June 1989.
97. "Direct Simulation of Reentry Flows with Ionization," A. B. Carlson and H. A. Hassan, AIAA Paper 90-0146, January 1990; also, *Journal of Thermophysics and Heat Transfer*, Vol. 6, pp. 400-404, July 1992.
98. "An Abbreviated Reynolds Stress Turbulence Model for Airfoil Flow," R. L. Gaffney, Jr., M. D. Salas, and H. A. Hassan, AIAA Paper 90-1468, June 1990.
99. "A Hybrid Reynolds Averaged/PDF Closure Model for Supersonic Turbulent Combustion," S. H. Frankel, J. P. Drummond, and H. A. Hassan, AIAA Paper 90-1573, June 1990.
100. "Monte Carlo Simulation of Vibrational Relaxation in Nitrogen," D. P. Olynick, J. N. Moss, and H. A. Hassan, AIAA Paper 90-1767, June 1990; also, *Journal of Thermophysics and Heat Transfer*, Vol. 6, pp. 22-26, January 1992.
101. "Monte Carlo Simulation of Re-Entry Flows Using a Bimodal Vibration Model," D. P. Olynick, J. N. Moss, and H. A. Hassan, *Journal of Thermophysics and Heat Transfer*, Vol. 4, pp. 273-277, July 1990.
102. "Direct Simulation Monte Carlo with Ionization and Radiation," A. B. Carlson and H. A. Hassan, 17th International Symposium on Rarefied Gas Dynamics, Edited by A. E. Beylich, VCH, Weinheim, Germany, pp. 763-769, 1991.
103. "A One-Equation Turbulence Model for Transonic Airfoil Flows," R. A. Mitcheltree, M. D. Salas, and H. A. Hassan, AIAA Paper 89-0557, January 1989; also, *AIAA Journal*, Vol. 26, pp. 1625-1632, September 1990.
104. "Numerical Modeling of Turbulent Supersonic Reacting Coaxial Jets," D. R. Eklund, J. P. Drummond, and H. A. Hassan, AIAA Paper 89-0660, January 1989; also, *AIAA Journal*, Vol. 26, pp. 1633-1641, September 1990.
105. "Use of Finite Volume Schemes for Transition Simulation," C. C. Fenno, Jr., C. L. Streett, and H. A. Hassan, AIAA Paper 91-0743, January 1991; also, *AIAA Journal*, Vol. 30, pp. 1122-1125, April 1992.
106. "Monte Carlo Simulation of Nonequilibrium Shock Fronts," D. P. Olynick, J. N. Moss, and H. A. Hassan, AIAA Paper 91-1341, June 1991; also, *Journal of Thermophysics and Heat Transfer*, Vol. 6, No. 4, pp. 626-630, Oct.-Dec. 1992.

107. "Radiation Modeling with Direct Monte Carlo," A. B. Carlson, and H. A. Hassan, AIAA Paper 91-1409, June 1991; also, *Journal of Thermophysics and Heat Transfer*, Vol. 6, No. 4, pp. 631-636, Oct.-Dec. 1992.
108. "Radiation Transport Around Axisymmetric Blunt Body Vehicles Using a Modified Differential Approximation," Lin C. Hartung and H. A. Hassan, AIAA Paper 92-0119, January 1992; also, *Journal of Thermophysics and Heat Transfer*, Vol. 7, No. 2, pp. 220-227, April-June 1993.
109. "An Assumed PDF Approach for the Calculation of Supersonic Mixing Layers," R. A. Baurle, J. P. Drummond, and H. A. Hassan, AIAA Paper 92-0182, January 1992.
110. "Monte Carlo Simulation of Reentry Flows with Ionization," Jeff C. Taylor, Ann B. Carlson, and H. A. Hassan, AIAA Paper 92-0493, January 1992.
111. "Monte Carlo Simulation of Entry in the Martian Atmosphere," David B. Hash and H. A. Hassan, AIAA Paper 92-0494, January 1992; Also, *Journal of Thermophysics and Heat Transfer*, Vol. 7, No. 2, pp. 228-232, April-June, 1993.
112. "A New Approach for the Calculation of Transitional Flows," T. Wayne Young, Eric S. Warren, Julius E. Harris, and H. A. Hassan, AIAA Paper 92-2669, June 1992; also, *AIAA Journal*, Vol. 31, No. 4, pp. 629-636, April 1993.
113. "Direct Simulation with Vibration-Dissociation Coupling," D. B. Hash and H. A. Hassan, AIAA Paper 92-2875, July 1992; also *Journal of Thermophysics and Heat Transfer*, Vol. 7, No. 4, pp. 680-686, Oct.-Dec. 1993.
114. "A New Two-Temperature Dissociation Model for Reacting Flows," D. P. Olynick and H. A. Hassan, AIAA Paper 92-2943, July 1992; also *Journal of Thermophysics and Heat Transfer*, Vol. 7, No. 4, pp. 687-696, Oct.-Dec. 1993.
115. "An Assumed Joint-Beta PDF Approach for Supersonic Combustion," R. A. Baurle, G. A. Alexopoulos, J. P. Drummond, and H. A. Hassan, AIAA Paper 92-3842, July 1992.
116. "Direct Simulation of Diatomic Gases Using the Generalized Hard Sphere Model," D. B. Hash and H. A. Hassan, AIAA Paper 93-0730, January 1993.
117. "A Generalized Hard-Sphere Model for Monte Carlo Simulation," H. A. Hassan and D. B. Hash, *The Physics of Fluids*, Vol. 5, No. 3, pp. 738-744, March 1993.
118. "A  $k-\omega$  Multivariate Beta PDF for Supersonic Combustion," G. A. Alexopoulos, R. A. Baurle, and H. A. Hassan, AIAA Paper 93-2197, June 1993.
119. "Modeling of Turbulent Supersonic H<sub>2</sub>-Air Combustion with an Improved Joint Beta PDF," R. A. Baurle and H. A. Hassan, AIAA Paper 93-2198, June 1993.

120. "Monte Carlo Simulation of Radiating Re-Entry Flows," Jeff C. Taylor, Ann B. Carlson, and H. A. Hassan, AIAA Paper 93-2809, July 1993; also, *Journal of Thermophysics and Heat Transfer*, Vol. 8, No. 3, pp. 478-485, July-September 1994.
121. "Comparisons Between DSMC and Navier-Stokes Equations for Re-Entry Flows," D. R. Olynick, J. C. Taylor, and H. A. Hassan, AIAA Paper 93-2810, July 1993, also, *Journal of Thermophysics and Heat Transfer*, Vol. 8, No. 2, pp. 251-258, April-June 1994.
122. "Monte Carlo Simulation Using Attractive-Repulsive Potential," D. B. Hash and H. A. Hassan, in *Rarefied Gas Dynamics: Theory and Simulations, Progress in Astronautics and Aeronautics*, edited by B. D. Shizzal and D. P. Weaver, Vol. 159, pp. 284-293, 1994.
123. "Effects of Chemistry and Rarefaction on Blunt Body Wake Structure," V. K. Dogra, R. G. Wilmoth, J. N. Moss, J. C. Taylor, and H. A. Hassan, AIAA Paper 94-0352, January 1994; also, *AIAA Journal*, Vol. 33, No. 3, pp. 463-469, March 1995.
124. "Rates of Thermal Relaxation in Direct Simulation Monte Carlo Methods," B. L. Haas, D. B. Hash, G. A. Bird, F. E. Lumpkin, III and H. A. Hassan, *Physics of Fluids*, Vol. 6, No. 6, pp. 2191-2201, June 1994.
125. "A Transition Model for High Speed Flow," E. S. Warren, J. E. Harris and H. A. Hassan, AIAA Paper 94-1851, June 1994; also, *AIAA Journal*, Vol. 33, No. 8, August 1995, pp. 1391-1397.
126. "Upwind Methods for Ionized Flows," J. C. Taylor, D. R. Olynick, and H. A. Hassan, AIAA Paper 94-1957, June 1994.
127. "Rarefaction Effects on Blunt Body Wake Structure for Earth Entry Conditions," V. K. Dogra, J. N. Moss, R. G. Wilmoth, J. C. Taylor, and H. A. Hassan, AIAA Paper 94-2016, June 1994; also, *Journal of Thermophysics and Heat Transfer*, Vol. 9, No. 3, July-September 1995, pp. 464-470.
128. "Parallel DSMC Solution of Three-Dimensional Flow Over a Finite Flat Plate," R. P. Nance, R. G. Wilmoth, B. Moon, H. A. Hassan, and J. Saltz, AIAA Paper 94-2019, June 1994; also, *Journal of Thermophysics and Heat Transfer*, Vol. 9, No. 3, July-September 1995, pp. 471-477.
129. "Direct Numerical Simulation of Leading Edge Receptivity to Sound for Flow Over Parabolic Cylinders," C. C. Fenno, Jr. and H. A. Hassan, AIAA Paper 94-2369, June 1994.
130. "Comparison of Assumed and Evolution PDF's in Supersonic Turbulent Combustion Calculations," R. A. Baurle, A. T. Hsu, and H. A. Hassan, AIAA Paper 94-3180, June 1994; also, *Journal of Propulsion and Power*, Vol. 11, No. 6, November-December, 1996, pp. 1132-1138.
131. "Assumed Joint Probability Density Function Approach for Supersonic Turbulent Combustion," R. A. Baurle, G. A. Alexopoulos, and H. A. Hassan, *Journal of Propulsion and Power*, Vol. 10, No. 4, July-August 1994, pp. 473-484.



132. "Direct Simulation of Diatomic Gases Using the Generalized Hard Sphere Model," D. B. Hash, J. N. Moss, and H. A. Hassan, *Journal of Thermophysics and Heat Transfer*, Vol. 8, No. 4, Oct.-Dec. 1994, pp. 758-764.
133. "Modelling of Supersonic Turbulent Combustion Using Assumed Probability Density Functions," R. A. Baurle, G. A. Alexopoulos, and H. A. Hassan, *Journal of Propulsion and Power*, Vol. 10, No. 6, November-December, 1994, pp. 777-786.
134. "A Unified Turbulence Closure Model for Axisymmetric and Planar Free Shear Flows," D. R. Robinson, J. E. Harris, and H. A. Hassan, AIAA Paper 95-0360, January 1995; also, *AIAA Journal*, Vol. 33, No. 12, December 1995, pp. 2325-2331.
135. "A DSMC Navier-Stokes Hybrid Solver," David B. Hash and H. A. Hassan, AIAA Paper 95-0410, January 1995.
136. "The GHS Interaction Model for Strong Attractive Potentials," J. A. Kunc, D. B. Hash, and H. A. Hassan, *The Physics of Fluids*, Vol. 7, No. 5, pp. 1173-1175, May 1995.
137. "A Radiation Absorption Model for the DSMC Method," J. C. Taylor, H. A. Hassan, and L. Hartung Chambers, in *Rarefied Gas Dynamics 19*, J. K. Harvey and R. G. Lord, Editors, Vol. 2, 1995, pp. 829-835.
138. "Rarefaction Effects on Blunt-Body Wake Structure," V. K. Dogra, J. N. Moss, J. C. Taylor, D. B. Hash, and H. A. Hassan, in *Rarefied Gas Dynamics 19*, J. K. Harvey and R. G. Lord, Editors, Vol. 2, 1995, pp. 1154-1160.
139. "Direct Simulation of Shock Front Radiation in Air," A. K. Berghausen, J. C. Taylor, and H. A. Hassan, AIAA Paper 95-2051, June 1995; also, *Journal of Thermophysics and Heat Transfer*, Vol. 10, No. 3, July-September, 1996, pp. 413-418.
140. "Analysis of Supersonic Combustors with Swept Ramp Injectors," R. A. Baurle, G. A. Alexopoulos, and H. A. Hassan, AIAA Paper 95-2413, July 1995; also, *Journal of Propulsion and Power*, Vol. 13, No. 2, March-April, pp. 327-328, 1997.
141. "A Decoupled DSMC/Navier-Stokes Analysis of a Transitional Flow Experiment," D. B. Hash, and H. A. Hassan, AIAA Paper 96-0353, January 1996.
142. "A Comparison of Grid-Definition Schemes for DSMC," R. P. Nance, R. G. Wilmoth, and H. A. Hassan, AIAA Paper 96-0604, January 1996; also, *Journal of Thermophysics and Heat Transfer*, Vol. 11, No. 2, April-June, 1997, pp. 296-303.
143. "Assessment of Schemes for Coupling Monte Carlo and Navier-Stokes Solution Methods," D. B. Hash and H. A. Hassan, *Journal of Thermophysics and Heat Transfer*, Vol. 10, No. 2, April-June 1996, pp. 242-249.
144. "A Novel Approach for Calculating Equilibrium Radiating Flows," F. Brauns and H. A. Hassan, AIAA Paper 96-1887, June 1996; also, *Journal of Thermophysics and Heat Transfer*, Vol. 11, No. 1, January-March, 1997, pp. 52-58.

145. "A  $k-\zeta$  (Enstrophy) Compressible Turbulence Model for Mixing Layers and Wall Bounded Flows," G. A. Alexopoulos and H. A. Hassan, AIAA Paper 96-2039, June 1996; also, *AIAA Journal*, Vol. 35, No. 7, July 1997, pp. 1221-1224.
146. "A Two-Equation Turbulence Closure Model for Wall Bounded and Free Shear Flows," D. F. Robinson and H. A. Hassan, AIAA Paper 96-2057, June 1996; also, *AIAA Journal*, Vol. 36, No. 1, January 1998, pp. 109-111.
147. "Modeling Turbulence in the Presence of Adverse Pressure Gradients," M. S. Rao and H. A. Hassan, AIAA Paper 96-2429, June 1996; also, *Journal of Aircraft*, Vol. 35, No. 3, May-June 1998, pp. 500-502.
148. "Modeling of Separated Turbulent Flows," D. F. Robinson and H. A. Hassan, AIAA Paper 97-0207, January 1997.
149. "Role of Boundary Conditions in Monte Carlo Simulation of MEMS Devices," R. P. Nance, D. B. Hash and H. A. Hassan, AIAA Paper 97-0375, January 1997; also, *Journal of Thermophysics and Heat Transfer*, Vol. 12, No. 3, July-September 1998, pp. 447-449.
150. "An Alternative to the  $e^n$  Method for Determining Onset of Transition," E. S. Warren and H. A. Hassan, AIAA Paper 97-0824, January 1997; also, *AIAA Journal*, Vol. 36, No. 1, January 1998, pp. 111-113.
151. "A Transition Model for Swept Wing Flows," E. S. Warren and H. A. Hassan, AIAA Paper 97-2245, June 1997.
152. "Modeling Turbulence without Damping Functions Using  $k-\zeta$  Model," D. F. Robinson and H. A. Hassan, AIAA Paper 97-2312, June 1997.
153. "Two-Dimensional Coupling Issues of Hybrid DSMC/Navier-Stokes Solvers," D. B. Hash and H. A. Hassan, AIAA Paper 97-2507, June 1997.
154. "Transition and Turbulence Modeling for Blunt-Body Wake Flows," Robert P. Nance, Thomas J. Horvath, and H. A. Hassan, AIAA Paper 97-2570, June 1997.
155. "A Transition Closure Model for Predicting Transition Onset," E. S. Warren and H. A. Hassan, SAE Paper 97-5502, October 1997; also, *Journal of Aircraft*, Vol. 35, No. 5, September-October 1998, pp. 769-775.
156. "Solution of Transitional Wake Flows at Mach 10," R. P. Nance, B. R. Hollis, T. J. Horvath, and H. A. Hassan, AIAA Paper 98-2939, June 1998.
157. "Further Development of the  $k-\zeta$  (Enstrophy) Turbulence Closure Model," D. F. Robinson and H. A. Hassan, *AIAA Journal*, Vol. 36, No. 10, October 1998, pp. 1825-1833.
158. "Turbulence Modeling of Shock-Dominated Flows with a  $k-\zeta$  Formulation," R. P. Nance and H. A. Hassan, AIAA Paper 99-0153, January 1999.

159. "Computational Study of Hypersonic Transitional Wake Flow," R. P. Nance, B. R. Hollis, T. J. Horvath, S.J. Alter, and H. A. Hassan, *Journal of Thermophysics and Heat Transfer*, Vol. 13, No. 2, April-June 1999, pp. 236-242.
160. "Study of High-Lift Configurations using k- $\zeta$  Transition/Turbulence Model," R. M. Czerwiec, J. R. Edwards, C. L. Rumsey, A. Bertelrud, and H. A. Hassan, AIAA Paper 99-3186, June 1999, also, *Journal of Aircraft*, Vol. 37, No. 6, November-December 2000, pp. 1008-1016.
161. "Transition Onset Prediction for High Speed Flow," McDaniel, R. D., Nance, R. P., and Hassan, H. A., AIAA Paper 99-3792, June 1999, also, *Journal of Spacecraft and Rockets*, Vol. 37, No. 3, May-June 2000, pp. 304-309.
162. "Development of One-Equation Transition/Turbulence Models," J. R. Edwards, C. J. Roy, F. G. Blottner, and H. A. Hassan, AIAA Paper 2000-0133, January 2000; also, *AIAA Journal*, Vol. 39, No. 9, September 2001, pp. 1691-1698.
163. "Theory and Experiment of Multielement Airfoils – A Comparison," R. Czerwiec, J. R. Edwards, C. L. Rumsey, and H. A. Hassan, AIAA Paper 2000-0985, January 2000.
164. "Study of Bypass Transition Using the k- $\zeta$  Framework," R. D. McDaniel, and H. A. Hassan, AIAA Paper 2000-2310, June 2000.
165. "Transition Onset Predictions for High-Lift Configurations," R. M. Czerwiec, J. R. Edwards, and H. A. Hassan, ICAS 2000-345, 22<sup>nd</sup> International congress of aeronautical Sciences, Aug. 27-Sept. 11, 2000. Proceedings on CD-ROM, Published by Optimage Ltd., Edinburgh, UK, 2000.
166. "Role of Bypass Transition in Conventional Hypersonic Facilities," R. D. McDaniel and H. A. Hassan, AIAA Paper 2001-0209, January 2001.
167. "Transitional Flow Over an Elliptic Cone at Mach 8," X. Xiao, J. R. Edwards, and H. A. Hassan, AIAA Paper 2001-0276, January 2001, also, *Journal of Spacecraft and Rockets*, Vol.38, No.6, November-December 2001, pp.941-945.
168. "Transition Mechanisms in Conventional Hypersonic Wind Tunnels," R. D. McDaniel and H. A. Hassan, *Journal of Spacecraft and Rockets*, Vol. 38, No. 2, March-April 2001, pp. 180-184.
169. "Validation of a Hybrid Reynolds Averaged/large Eddy Simulation Method for Simulating Cavity Flameholder Configurations," J. R. Edwards, M. Tian, T. Fan and H. A. Hassan, AIAA Paper 2001-2929, June 2001.
170. "An Assessment of Boundary Treatment and Algorithm Issues on Hybrid RANS/LES Solution Strategies," R. A. Baurle, C.-J. Tam, J. R. Edwards, H. A. Hassan, AIAA Paper 2001-2562, June 2001.

171. "Study of Transition in a High-Disturbance Environment," R. D. McDaniel and H. A. Hassan, *Journal of Aircraft*, Vol.38, No. 6, November-December 2001, 1051-1055.
172. "Hybrid LES/RANS Simulation of a Shock Wave/ Boundary Layer Interaction," T. C. Fan, X. Xiao, J. R. Edwards, H. A. Hassan, and R. A. Baurle, AIAA Paper 2002-0431, January, 2002.
173. Inflow Boundary Conditions for LES/RANS Simulations with Applications to Shock Wave/Boundary Layer Interactions," X. Xiao, J. R. Edwards, H. A. Hassan, and R. A. Baurle, AIAA Paper 2003-0079, January 2003.
174. "Hybrid LES/RANS Simulation of a Mach 3 Shock Wave/Boundary Layer Interaction," T. C. Fan, X. Xiao, J. R. Edwards, H. A. Hassan, and R. A. Baurle, AIAA Paper 2003-0080.
175. "Simulation of Transitional Flow Over an Elliptic Cone at Mach 8 using a One-Equation Transition/Turbulence Model," A. M. Malechuk, J. R. Edwards, and H. A. Hassan, AIAA Paper 2003-1132, January 2003
176. "Investigation of Flow Dependent Blending Functions in Hybrid LES/RANS Simulations," X. Xiao, J. R. Edwards, and H. A. Hassan, AIAA Paper 2003-3462, June 2003.
177. "Hybrid Simulation Approach for Cavity Flows: Blending, Algorithm, and Boundary Treatment Issues," R. A. Baurle, C.-J. Tam, J. R. Edwards, and H. A. Hassan, *AIAA Journal*, Vol.41, No.8, 2003, pp.1463-1480.
- 178 "Inflow Boundary Conditions for Hybrid Large Eddy/Reynolds Averaged Navier-Stokes Simulations," X. Xiao, J. R. Edwards, H. A. Hassan, and R. A. Baurle, *AIAA Journal*, Vol. 41, No.8, 2003, pp.1481-1489.
- 179 "Hybrid Large-Eddy/Reynolds-Averaged Navier-Stokes Simulations of Shock-Separated Flows," C.-C Fan, X. Xiao, J. R. Edwards, H. A. Hassan, and R. A. Baurle, *Journal of Spacecraft and Rockets*, Vol. 41, No. 6, 2004, pp. 897-906.
- 180 "Blending Functions in Hybrid Large-Eddy/Reynolds-Averaged Navier-Stokes Simulations," *AIAA Journal*, Vol. 42, No. 12, 2004, pp.2508-2515.
- 181 "Dynamically Resolved Simulation of Atmospheric Features and Turbulence – Initial Results," X. Xiao, D. S. McRae, AIAA Paper 2005-0265, January 2005.
- 182 "Hybrid Large-Eddy/Reynolds-Averaged Navier-Stokes Simulation of Mach 8.3 Flow over a Flat Plate," AIAA Paper 2005-0882, January 2005.
- 183 "Role of Turbulent Prandtl Number on Heat Flux at Hypersonic Mach Numbers," X. Xiao, J. R. Edwards, H. A. Hassan, and R. L. Gaffney, Jr., AIAA Paper 2005-1098, January, 2005, also, *AIAA Journal*, Vol. 45, No. 4, 2007, pp.806-813.
- 184 "Variable Turbulent Schmidt Number Formulation For Scramjet Application," X. Xiao, J. R. Edwards, H. A. Hassan, and A. D. Cutler, AIAA Paper 2005-1099, January 2005, also, *AIAA Journal*, Vol.44, No.3, 2006, pp.593-599.

- 185 "Turbulence Modeling for Scramjet Applications," R. G. Keisler, R. I. Gaffney, Jr., X. Xiao, and H. A. Hassan, AIAA Paper 2005-5382, June 2005.
- 186 "Atmospheric Optical Turbulence," X. Xiao, D. S. McRae, H. A. Hassan, F. H. Ruggiero, and G. Y. Jumper, AIAA Paper 2006-0077, January 2006.
- 187 "Modeling Scramjet Flows with Variable Turbulent and Schmidt Numbers." X. Xiao, H. A. Hassan, R. A. Baurle, AIAA Paper 2006-0128, January 2006, also, *AIAA Journal*, Vol. 45, No. 6, 2007, pp.1415-1423..
- 188 "A Three-Dimensional Computational Study of a Circulation Control Wing," G. McGowan, C. L Rumsey, R. C. Swanson, Jr., and H. A. Hassan, AIAA Paper 2006-3677, June 2006.
- 189 "Simulation of Supersonic Combustion Using Variable Prandtl and Schmidt Numbers Formulation," P. G. Keistler, X. Xiao, H. A. Hassan and C. G. Rodrigues, AIAA Paper 2008-3733, June 2006.
- 190 "Role of Turbulence Modeling in Flow Prediction of Circulation Control Airfoils," G. McGowan, A. Gopalarathnam, X. Xiao, and H. Hassan, in *Application of Circulation Control Technology, Progress in Astronautics and Aeronautics*, Edited by R. D. Joslin and G. S. Jones, Vol. 214, Chap. 19, 2006, pp.400-510.
- 191 "Role of Grid Adaptation in Optical Turbulence Prediction," Xudong Xiao, D. Scott McRae, Hassan A. Hassan, George Y. Jumper, Frank H. Ruggiero, and Arthur J. Jackson, AIAA Paper 2007-0083, January, 2007.
- 192 "Simulation of the SCHOLAR Supersonic Combustion Experiments," P.G. Keistler, X. Xiao, H. A. Hassan, and A. D. Cutler, AIAA Paper 2007-0835, January, 2007.
- 193 "Turbulent Aeroheating on the Mars Science Laboratory Entry Vehicle," M. D. Bynum, B. R. Hollis, H. A. Hassan, and X. Xiao, AIAA Paper 2007-4393, June 2007, Also, *Journal of Thermophysics and Heat Transfer*, Vol.22, No.2, 2008, pp.306-309.
- 194 "Role of Chemistry/Turbulence Interaction in 3-D Supersonic Combustion," P. G. Keistler, H. A. Hassan, and X. Xiao, AIAA Paper 2008-0087. January 2008.
- 195 "Simulation of Supersonic Combustion Using Variable Turbulent Prandtl and Schmidt Numbers," H. A. Hassan and P. G. Keistler, JANNAF-936, May, 2008
- 196 "Simulation of Supersonic Combustion using H<sub>2</sub>/Air and C<sub>2</sub>H<sub>4</sub>/Air," P. G. Keistler and H. A. Hassan, AIAA Paper 2009-0028, January, 2009. Also, *AIAA Journal*, Vol. 48, No. 1, January, 2010, pp.166-173
- 197 "Improved Prediction of Optical Scale Turbulence-Progress and Future Direction," X. Xiao, D. S. McRae, H. A. Hassan, G. Y. Jumper, F. H. Ruggiero and A. J. Jackson, AIAA Paper

2009-0120, January, 2009

- 198 "Improved Modeling of Shock Layer Radiation in Air," E. R. McCorkle, D. Bose, D. B. Hash, and H. A. Hassan, AIAA Paper 2009-1028, January, 2009.
- 199 "Examination of EAST Data Using Updated NEQAIR: Shock Tube Flow," E. R. McCorkle, H. A. Hassan, and M. D. Barnhardt, AIAA Paper 2009-3921, June, 2009.
- 200 "Development of Methods to Predict the Effects of Test Media in Ground-Based Propulsion Testing," J. P. Drummond, P. M. Danehy, R. L. Gaffney, Jr., P. A. Parker, S. A. Tedder, H. K. Chelliah, A. D. Cutler, D. Bivolaru, P. Givi, and H. A. Hassan, NASA/TM-2009-215766, June, 2009.
- 201 "Simulation of Supersonic Combustion in Three-Dimensional Configurations," P. G. Keistler, H. A. Hassan, and X. Xiao, *Journal of Propulsion and Power*, Vol. 25, No. 6, 2009, pp.1233-1239.
- 202 "Role of Viscous Effects on NEQAIR Prediction of EAST Measurements," E. R. McCorkle, H. A. Hassan, B. A. Cruden, and M. D. Barnhardt, AIAA Paper 2010-0236, January, 2010.
- 203 "Simulation of Shock/Boundary Layer Interaction Using Improved LES/RANS Models," D. A. Giesecking, J. Choi, J. R. Edwards, and H. A. Hassan, AIAA Paper 2010-0111, January, 2010.
- 204 "Study of Radiation in Electric Arc Shock Tube," E. R. McCorkle, and H. A. Hassan, AIAA Paper 2010-4516, June 2010.
- 205 "Pyrolysis Mechanism of PICA," J. B. Scoggins and H.A. Hassan, AIAA Paper 2010-4655, June 2010.
- 206 "Development of Reduced Kinetic Mechanism for PICA Pyrolysis Products," J. B. Scoggins, N. N. Mansour, and H. A. Hassan, AIAA Paper 2011-3126, June 2011.
- 207 "Spectroscopic Data and Model Prediction for Venus and Mars Atmospheres," J. J. Rodio and H. A. Hassan, AIAA Paper 2011-3949, June 2011.
- 208 "Role of Turbulence Modeling in Supersonic Combustion," H. A. Hassan, J. R. Edwards, J. A. Fulton, AIAA Paper 2011-5829, August 2011.
- 209 "Compressible-Flow Simulations Using a New Large-Eddy Simulation/Reynolds Averaged Navier-Stokes Model," D. A. Giesecking, J. -I. Choi, J. R. Edwards, and H. A. Hassan, *AIAA Journal*, Vol.49, No. 10, 2011, pp.2194-2209.
- 210 "Large -Eddy/Reynolds averaged Navier-Stokes Simulation of a Dual-Mode Scramjet Combustor", J. A. Fulton, J. R. Edwards, and H. A. Hassan, AIAA Paper 2012-0115, January, 2012
- 211 "A New Approach for Modeling Turbulent Stress Equation," X.Xiao and H. A. Hassan, AIAA Paper 2012- 2717, June, 2012.

212 “Role of Chemical Kinetic Models in Simulating Scramjet Flows,” H. A. Hassan, J.E. Edwards, and J. A. Fulton, AIAA Paper 2012-3927, July, 2012.

213 “Continued Hybrid LES/RANS Simulation of Hypersonic Dual-Mode Scramjet Combustor,” J. A. Fulton, J.R. Edwards, H.A. Hassan, J. McDaniel, C. Goyne, R. Rockwell, AIAA Paper, 2013-0117, January, 2013.

214 “A New Local Formulation of the  $k$ - $\zeta$  Transitional/Turbulence Model,” J. J. Rodio, H. A. Hassan, AIAA Paper 2013-0994. January, 2013.

215 “NASA Trapezoidal Wing Simulation Using Stress- $\omega$  and One- and Two-Equation Turbulence Model,” J.J. Rodio, Xiao, X, Hassan, and C. L. Rumsey, AIAA Paper AIAA-2014-0404, January, 2014