Gary C. Cheng

Associate Professor
Aerospace Engineering and Mechanics Department, University of Alabama
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Education:

10/87 - 12/90	Ph.D.	Aerospace Engineering	University of Kansas
08/84 - 10/87	M.S.	Aerospace Engineering	University of Kansas
10/77 - 05/81	B.S.	Aeronautic Engineering	Tamkang University, Taiwan

Appointments:

08/14 – present	Associate Professor, Aerospace Engineering & Mechanics (AEM) Dept., UA
10/06 – 07/14	Associate Professor, Mechanical Engineering (ME) Dept., UAB
01/14 – 07/14	Faculty member, Materials Processing & Applications Development (MPAD) Center
06/12 – present	Advisory board, Advanced Rocket Research Center, National Chiao Tung University (NCTU), Taiwan
01/12 – 06/12	Visiting Associate Professor, ME Dept., NCTU, Taiwan
09/05 – 07/14	Faculty member, Center for Computational and Structural Biology (CCSB)
08/01 – 09/06	Assistant Professor, ME Dept. UAB
01/91 – 07/01	Senior Research Engineer, SECA, Inc., Huntsville, Alabama.
01/88 - 12/90	Research Assistant/Project Manager, FRL, CRINC, Univ. of Kansas.
05/85 - 01/88	Research Assistant, FRL, CRINC, Univ. of Kansas.

Awards and Honors:

2011	*Associate Fellow*, AIAA (American Institute of Aeronautics and Astronautics)
2005	*Engineering School Excellence in Teaching Award* University of Alabama at Birmingham
2004	*Engineering School Excellence in Teaching Award* University of Alabama at Birmingham
2002	NASA Summer Faculty Fellow
2002	Awarded by NASA Marshall Space Flight Center for a technical innovation, entitled "Three-Dimensional, Three-Phase Combustion Computational Fluid Dynamics Code"
1995	Awarded by NASA Marshall Space Flight Center for a technical innovation, entitled "Inducer Analysis/Pump Model Development"

Professional Activities and Services:

Reviewer (Scientific Journals):

Journal of Propulsion and Power
Journal of Thermophysics and Heat Transfer
Journal of Spacecraft and Rockets
Computers and Fluids
Journal of Mathematics and Computers in Simulation
International Journal for Numerical Methods in Fluids
International Journal of Thermal Sciences
Journal of Applied Numerical Mathematics
Journal of Computational and Applied Mathematics
Aerospace Science and Technology
Chemical Engineering Science

Chemical Engineering Communication
Medical Engineering & Physics

Reviewer (Scientific Societies):
The Center for Advanced Interdisciplinary Research in Materials (CIMAT)

Member of Committee (extramural):
2004-2007   NSF MRAC/LRAC (Medium Resource Allocations Committee/Large Resource Allocations Committee)

Advisor of Sigma Gamma Tau UA Chapter:
2015-preset

Member of Committee (intramural):

<u>University-wide</u>
2005-2006   Faculty Senate, UAB
2005-2006   Faculty Senate liaison for Engineering school, UAB
2004-2005   Alternate Faculty Senate, UAB

<u>School-wide</u>
2013-2013   Interim director, Interdisciplinary Engineering Ph.D. program, UAB
2009-2012   School of Engineering, Faculty Affair Committee, UAB
2008-2009   Chair, School of Engineering, Academic Affair Committee, UAB
2006-2008   Co-director, Environmental Health Engineering Ph.D. program, UAB
2006-2008   School of Engineering, Academic Affair Committee, UAB
2006-2010   School of Engineering, MA126 Committee, UAB
2004-2014   Engineering School Diversity Committee, Engineering School, UAB
2001-2014   Engineering School Dupuis Scholarship Committee, UAB

<u>Departmental</u>
2012-2013   Tenure review committee, ME Dept., UAB
2012-2013   Chair, search committee of thermal-fluid faculty, ME Dept., UAB
2012-2013   Search committee of mechanical system faculty, ME Dept., UAB
2012-2014   Tenure review committee, ME Dept., UAB
2009-2014   Chair, subcommittee of ABET and SACS outcome assessment, ME Dept., UAB
2009-2010   Chair, search Committee of Thermal-Fluid Instructor, ME Dept., UAB
2006-2007   Tenure review committee, ME Dept., UAB
2005-2014   Distant learning committee, ME Dept., UAB
2004-2006   Co-director, Master of Science Mechanical Engineering Dept. Program, UAB
2004-2007   High-performance computing facility committee, ME Dept., UAB
2001-present Thermal-fluid committee, ME Dept., UAB

Consulting
Blue Origin, Seattle, WA
Northrop-Grumman Space Technology, Redondo Beach, CA
Southern Research Institute, Birmingham, AL
Gas Technology Institute, Chicago, IL
Sierra Engineering Inc., Carson City, NV
Convergence Engineering Corp., Gardnerville, NV
Amplicode Inc., Birmingham, AL
Engineering Science Inc., Huntsville, AL

Research Interests:

1. Modeling and simulation of flows with complex physics related to various propulsion systems:
   - Spray combustion in liquid and hybrid rocket propulsion systems
   - Effects of thermal and dynamic response associated with fluid-structure interactions
   - Multi-phase real-fluid flows of cryogenic and storable propellants
   - Performance analyses of components and their integration associated with the propulsion system of interest
   - Pollutant transport, flows through porous media, electro-magnetic waves, etc.

2. High-order accuracy Navier-Stokes solver development based on the space-time conservation-element/solution-element (CESE) method for transient flow simulations such as shock/boundary layer/vortices/acoustic wave interactions, combustion instability, turbulence transition, etc.

3. Development of numerical methods and models for re-entry hypersonic aerothermodynamics:
   - Hybrid DSMC/Navier-Stokes approach for rarefied-to-continuum gases
   - Integrated molecular dynamics/continuum framework for modeling in-depth pyrolysis of surface ablation
   - Parallel finite-volume method for non-equilibrium radiative heat transfer computations
   - Turbulence transition

4. Collaborate with researchers of different expertise to perform interdisciplinary studies:
   - Fully and loosely coupled solvers for computing fluid-structure interactions, including dynamic, heat loads and aero-elasticity
   - Overset chimera and moving/adapting grid topologies for moving- and deforming-body simulations
   - Numerical simulations of unsteady bio-fluid flow with flexible wall boundaries, such as cardiovascular blood flows and pulmonary structure/airway interactions
   - Integration of numerical simulations with the enabling technologies (geometry and mesh construction from CAD and image scanning, and immersive visualization)
   - Quantum chemistry and molecular dynamics simulations for developing chemical kinetics associated with hydrocarbons and biomolecules

Courses Taught:
(Note: * *course that Dr. Cheng taught for the first time; # course developed by Dr. Cheng*)

UA:

Course Title	Time Offered
AEM311 Fluid Mechanics	Sp 2016*, Fa 2016
AEM349 Engineering Analysis	Fa 2014*, Fa 2015
AEM591 Turbulent Flows	Sp 2015*
AEM594 SP: Numerical Study of Propulsion System	Su 2015*
AEM694 SP: GPU-CPU Computing	Fa 2015*
AEM694 SP: Space-Time CESE Method	Sp 2016*

UAB:

Course Title	Time Offered
ME241 Thermodynamics I	Fa 2007*, Sp 2009
ME242 Thermodynamics II	Sp 2008*, Sp 2010
ME321 Introduction to Fluid Mechanics	Sp 2002*, Fa 2006, Fa 2009, Fa 2011,

	Fa 2013
ME361 Mechanical Engineering Laboratory	Fa 2003*
ME411/511 Applied Fluid Mechanics	Sp 2006*
ME414/514 Introduction to Computational Fluid Dynamics	Fa 2002*, Fa 2003, Fa 2004
ME615/715 Introduction to Turbulent Flows	Sp 2007*[#], Sp 2011
ME650/750 Transport Phenomena	Fa 2001*, Sp 2003, Sp 2004, Sp 2005, Fa 2008, Fa 2010, Sp 2014
ME657/757 Numerical Simulation of Combustion	Fa 2005*[#], Fa 2012
EGR710 Introduction to Interdisciplinary Engineering	Fa 2013*
EGR711 Methodology for Interdisciplinary Research	Sp 2014*

Grants and Contracts:

Current:

1. "Development and Validation of Physics-Based Sub-Models of High Pressure Supercritical Fuel Injection at Diesel Conditions," 01/2016 ~ 12/2018.

Previous:

1. "Shock Penetration Length of Counterflowing Jet on Low-Supersonic Slender Configurations," NIA/NASA LaRC, 09/2013 ~ 09/2014.

2. "Commercial Scale CO_2 injection and Optimization of Storage Capacity in the Southeastern United States," ARI/DoE, 10/2012 ~ 09/2015.

3. "Geologic Carbon Sequestration: Simulation of Carbon Dioxide Transport and Reactions in Caprock," Southern Company, 10/2012 ~ 09/2015.

4. "Development of Space-Time CESE Algorithms and Software Framework for High Fidelity Flow Simulations Using Unstructured Meshes," NIA/NASA LaRC, 12/2012 ~ 09/2014.

5. "Numerical Study of Mitigation of Sonic Boom using Long Penetration Mode Counter-Flowing Jets," NIA/NASA LaRC, 06/2012 ~ 12/2012.

6. "Support of Lastrac Development Towards CFD Integrated, User-Friendly Transition Analysis," NASA LaRC, 02/2010 ~ 05/2012.

7. "Support of EZ4D Development for High-Fidelity Hypersonic Computation," NASA LaRC, 02/2010 ~ 05/2013.

8. "Evaluation of Obstructive Sleep Apnea Syndrome by Computational Fluid Dynamics," NIH, 08/2008 ~ 07/2010.

9. "CFD Analysis of the Main Steam Header Alternative Design," Southern Nuclear Company, 04/2009 ~ 07/2009.

10. "Assessment and Improvement of Turbulence Transition Models," DoD/MSU, 06/2008~05/2009.

11. "CFD Study of Main Steam Line Vibration at Plant Farley," Southern Nuclear Company, 03/2008~08/2008.

12. "Uncertainty Analysis of Surface Ablation Model and its Integration with CFD Solver for Reentry Aerothermodynamics," NASA CUIP Phase II, 10/2007~6/2012.

13. "Support of USM3D Enhancements for Reacting Gas Capability," NASA LaRC, 10/2007~9/2009.

14. "Error Estimation in Heat Transfer Predictions using Overset Grids for External Aerothermodynamics," NASA CUIP Phase II, 10/2007 ~ 9/2008.

15. "Carbon Dioxide Enhanced Oil Production from the Citronelle Oil Field and Rodessa Formation, South Alabama," DoE, 01/2007~12/2011.

16. "Validation and Assessment of Turbulence Transition Model," DoD/MSU, 06/2007~05/2008.

17. "Development of a Chain-Reaction Model for the TCA Cycle of Yeast Genes," UAB CNGI pilot grant, 01/2007~07/2007.
18. "Development of Bioinformatics Tool with Pathway Classification," UAB CNGI pilot grant, 03/2006~09/2006.
19. "UAB GATE Center of Excellence in Advanced Lightweight Materials Technology," DoE/GATE, 08/2005~08/2010.
20. "Compilation, Setup and Testing of the Benchmark Test Cases for Turbulence Model Validation and Assessment," DoD/MSU, 06/2005~05/2006.
21. "Development of an Efficient CFD Model for Thermal Thrust Chamber Assembly Design," NASA/ESI, 06/2005~09/2006.
22. "Flow Augmented Thermal Management for Entry and Re-entry Environments," NASA/ESI, 06/2005~09/2005.
23. "Pollution Control Flow Modeling and Visualization Studies," Alabama Power and Southern Company Services, Inc., 06/2005~05/2006.
24. "Simulation Software Tool for Evaluation of Dilution and Cooling Systems for Gas Samples," Gas Technology Institute, 06/2004~08/2004.
25. "Third Generation Reusable Launch Vehicle Analysis & Optimization Systems," NASA URETI/Univ. of Florida, 08/2002~08/2007.
26. "Advancement and Validation of the Space-Time CE-SE Framework for High-Fidelity Viscous Flow Simulations," NASA Glenn Research Center, 05/2004~04/2007.
27. "UNS CFD Problem Setup Pre-Processor GUI Development," Engineering Sciences, Inc., 01/2004~04/2004.
28. "Validation of Hybrid RANS/LES Turbulence Models for Unsteady Flows," DoD/MSU, 09/2003~05/2004.
29. "Numerical Simulations of Pintle Injectors," Northrop Grumman Space Technology/Sierra Engineering, Inc., 04/2003~08/2003.
30. "Development of a CFD Design Tool for Biomass Gasification Combined-Cycle System", DoE/Southern Research Institute, 10/2002~03/2004.
31. "Development of Ideal Fluid Model for Spray Combustion in Liquid Rocket Engines," NASA Marshall Space Flight Center, 05/2002~04/2004.
32. "Analyses of the Hot Flow Environment for Some Swirl Injector Configurations," DoD/Sierra Engineering, Inc., 05/2002.

Publications:

Textbook:

Farmer, R.C., **Cheng G.C**., Chen, Y-S, and Pike, R.W., *Computational Transport Phenomena for Engineering Analyses*, CRC Press, Taylor & Francis Group, 2009.

Book chapters:

1. Wang, T.-S., Canabal, F., Chen, Y.-S., **Cheng, G.C.**, and Ito, Y., "Nuclear Reactor Thermal Hydraulics and other Applications," *Thermal Hydraulics Design and Analysis Methodology for a Solid-Core Nuclear Thermal Rocket Engine Thrust Chamber*, Chapter 4, Donna Guillen (Ed.), ISBN: 978-953-51-0987-7, Intech Publishing Company, 2013, pp. 107-133, doi: 10.5772/52569.
2. Wu, J.-S., Lian, Y.-Y., **Cheng, G.C.**, and Chen, Y.-S., "Parallel Hybrid Particle-Continuum (DSMC-NS) Flow Simulation Using 3-D Unstructured Mesh," *Parallel Computational Fluid Dynamics*, Ed. J.H. Kwon *et al*., Elsevier, 2007, pp. 1-10, URL : http://www.dbpia.co.kr/Article/1920956.

3. **Cheng, G.C.**, Farmer, R.C., "Numerical Simulation of Spray Combustion Flows with Linearized Real-Fluid Model," *Computational Methods in Multiphase Flow III*, Brebbia, C.A. and Mammoli, A.A. (Eds.), WIT Press, 2005, pp. 193-206.

4. Soni, B.K., Koomullil, R.P., **Cheng, G.C.**, Shih, A.M., and Kim, J.E., "Enabling Technology Tools for Design of Aerospace Vehicles," *Recent Trends in Aerospace Design and Optimization*, Uthup, B., Koruthu, S.P., Sharma, R.K., and Priyadarshi, P. (Eds.), Tata McGraw-Hill, SAROD-2005, pp. 87-91.

5. Anayiotos, A., **Cheng, G.C**., Ito, Y., Gray, J., and Agarwal, R., "The Challenges of Imaging Based Computational Fluid Dynamics," *Medical Care Compunetics*, Eds (Bos L. and Laxminarayan S.), IOS press, 2004, pp. 225-232.

6. Farokhi, S., and **Cheng, G.C.**, "A Comparative Study of Turbulence Closure Models on the Performance Prediction of Planar and Conical Diffusers," *Computers & Experiments in Fluid Flow*, Carlomagna, G.M. and Brebbia, C.A. (Eds.), Springer Verlag, Berlin, 1989, pp.113-128.

*Refereed Journals***:**

1. **Cheng, G.C.**, Ito, Y., Chen, Y.-S., Wang, T.-S., "Numerical Study of Single Flow Element in a Nuclear Thermal Thrust Chamber," *Journal of Aeronautics and Aerospace Engineering*, 4: 153, 2015, doi:10.4172/2168-9792.1000153.

2. Gu, B., Raghunath, P., and **Cheng, G.C**., Chen, Y.-S., Wu, J.-S., and Lin, M.C., "Kinetic Modeling of Hypergolic Ignition of N_2H_4-NTO Mixtures at Low Temperatures and the Sawyer-Glassman Experiment on Reactions of N_2H_4 with NO_x (x=1,2) at High Temperatures," *International Journal of Energetic Materials and Chemical Propulsion*, Vol. 14, Issue 5, pp. 357-379, 2015, doi: 10.1615/IntJEnergeticMaterialsChemProp.2015011242.

3. Ramamoorthy, B., **Cheng, G.C.**, Koomullil, R.P., and Rahmani, R.K., "Finite Volume Method for Non-Equilibrium Radiative Heat Transfer," International Journal of Heat and Mass Transfer, 65, 2013, pp. 670-681, doi:10.1016/j.ijheatmasstransfer.2013.06.034.

4. Sittitavornwong, S., Waite, P.D., Shih, A.M., **Cheng, G.C.**, Koomullil, R.P., Ito, Y., Cure, J.K., Harding, S.M., and Litaker, M., "Computational Fluid Dynamic Analysis of the Posterior Airway Space After Maxillomandibular Advancement For Obstructive Sleep Apnea Syndrome," *Journal of Oral and Maxillofacial Surgery*, Elsevier Science, Vol. 71, Issue 8, 2013, pp. 1397-1405, doi:10.1016/j.joms.2013.02.022.

5. **Cheng, G.C.**, Koomullil, R.P., Ito, Y., Shih, A., Sittitavornwong, S., and Waite, P., "Assessment of Surgical Effects on Patients with Obstructive Sleep Apnea Syndrome Using Computational Fluid Dynamics Simulations," *Mathematics and Computers in Simulation*, Elsevier Science, Vol. 106, 2014, pp. 44-59, doi:10.1016/j.matcom.2012.11.008.

6. Lin, K.-M., Hu, M.-H., Hung, C.-T., Wu, J.-S., Hwang, F.-N., Chen, Y.-S., and **Cheng, G.C.**, "A Parallel Hybrid Numerical Algorithm for Simulating Gas Flow and Gas Discharge of an Atmospheric-Pressure Plasma Jet," *Computer Physics Communications*, Vol. 183, Issue 12, 2012, pp. 2550-2560, doi:10.1016/j.cpc.2012.07.004.

7. **Cheng, G.C.**, Chen, D.-T., Chen, J.J., Soong, S.-J., Lamartiniere, C., and Barnes, S., "A Chain Reaction Approach to Modelling Gene Pathways," *Translational Cancel Research*, 2012;1(2), pp. 61-73, doi:10.3978/j.issn.2218-676X.2012.05.06.

8. Wang, T.S., Lin, J., Ruf, J., Guidos, M., and **Cheng, G.C.**, "Effect of Coolant Flow Distribution on Transient Side-Load of Film-Cooled Nozzles," *AIAA Journal of Propulsion & Power*, Vol. 28, No. 5, 2012, pp. 1081-1090, doi:10.2514/1.59768.

9. Ito, Y., **Cheng, G.C.**, Shih, A.M., Koomullil, R.P., Soni, B.K., Sittitavornwong, S., and Waite, P.D., "Patient-Specific Geometry Modeling and Mesh Generation for Simulating Obstructive Sleep Apnea Syndrome Cases by Maxillomandibular Advancement," *Mathematics and*

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Computers in Simulation, Elsevier Science, Vol. 81, 2011, pp. 1876-1891, doi:10.1016/j.matcom.2011.02.006.

10. **Cheng, G.C.**, Venkatachari, B.S., Chang, C.L., and Chang, S.C., "Comparative Study of Different Numerical Approaches in Space-Time CESE Framework for High-Fidelity Flow Simulations," *Computers and Fluids*, Vol. 45, 2011, pp. 47-54, doi:10.1016/j.compfluid.2011.01.030.

11. **Cheng, G.C.**, Venkatachari, B.S., and Cozmuta, I., "Multi-scale Simulations of In-Depth Pyrolysis of Charring Ablative Thermal Protection Material," *Computers and Fluids*, Vol. 45, 2011, pp. 191-196, doi:10.1016/j.compfluid.2010.10.023.

12. Rahmani, R.K., Molavi, H., Ayasoufi, A., Koomullil, R.P., and **Cheng, G.C.**, "Solution of Radiative Boundary Design Problems Using a Combined Optimization Technique," *Numerical Heat Transfer*, Part B, Vol. 57, 2010, pp. 348-371, doi:10.1080/10407790.2010.489881.

13. Wang, T.S., Canabal, F., Chen, Y.S., and **Cheng, G.C**., "Multiphysics Computational Analysis of a Solid-Core Nuclear Thermal Engine Thrust Chamber," *AIAA Journal of Propulsion & Power*, Vol. 26, No. 3, 2010, pp. 407-414, doi:10.2514/1.47759.

14. Sittitavornwong, S., Waite, P.D., Shih, A.M., Koomullil, R.P., Ito, Y., **Cheng, G.C.**, and Wang, D., "Evaluation of Obstructive Sleep Apnea Syndrome by Computational Fluid Dynamic," *Seminars in Orthodontics*, Elsevier, Vol. 15, No. 2, 2009, pp. 105-131, doi:10.1053/j.sodo.2009.01.005.

15. Soni, B.K., Koomullil, R.P., **Cheng, G.C.**, Shih, A.M., and Kim, J.E., "Enabling Technology Tools for Design of Aerospace Vehicles", *Computational Fluid Dynamics Journal*, Vol. 16, No. 4, 2008, pp. 336-345.

16. Koomullil, R.P., **Cheng, G.C.**, Soni, B.K., Noak, R., and Prewitt, N., "Moving-Body Simulation Using Overset Framework with Rigid Body Dynamics," *Mathematics and Computers in Simulation*, Elsevier Science, Vol. 78, Issue 5-6, 2008, pp. 618-626, doi:10.1016/j.matcom.2008.04.009.

17. Venkatachari, B., **Cheng, G.C.**, Soni, B.K., and Chang, S.C., "Validation and Verification of Courant Number Insensitive CE/SE Method for Transient Viscous Flow Simulations," *Mathematics and Computers in Simulation*, Elsevier Science, Vol. 78, Issue 5-6, 2008, pp. 653-670, doi:10.1016/j.matcom.2008.04.007.

18. Chen, D.T., Chen, J., **Cheng, G.C.**, Lin, S.H., and Soong, S.J., "A Two-Stage Binomial Test Approach of Gene Identification in Oligonucleotide Arrays," *Journal of Biopharmaceutical Statistics*, 2007; 17(5):903-18, doi:10.1080/10543400701514064.

19. **Cheng, G.C.**, Koomullil, R.P., and Soni, B.K., "Multidisciplinary & Multi-scale Computational Field Simulations- Algorithms and Applications," *Mathematics and Computers in Simulation*, Elsevier Science, Vol. 75, Issue 5-6, September 2007, pp. 161-170, doi:10.1016/j.matcom.2006.12.007.

20. Wu, J.-S., Lian, Y.-Y., **Cheng, G.C**., Koomullil, R.P., and Tseng, K.-C., "Development and Verification of a Coupled DSMC-NS Scheme Using Unstructured Mesh," *Journal of Computational Physics*, Elsevier, Vol. 219, No. 2, 2006, pp. 579-607, doi:10.1016/j.jcp.2006.04.013.

21. **Cheng, G.C.**, Farmer, R.C., "Real Fluid Modeling of Multiphase Flows in Liquid Rocket Engine Combustors," *AIAA Journal of Propulsion & Power*, Vol. 22, No. 6, 2006, pp. 1373-1381, doi:10.2514/1.17272.

22. Farmer, R.C., Pike, R., and **Cheng, G.C**., "CFD Analyses of Complex Flows," *Computers & Chemical Engineering*, Vol. 29, Issue 11-12, Elsevier, Oct. 2005, pp. 2386-2403, doi:10.1016/j.compchemeng.2005.05.022.

23. Unnikrishnan, S., Huynh, T.N., Brott B.C., Ito, Y., **Cheng, G.C.**, Shih, A.M., Allon, M., Anayiotos, A.S., "Turbulent Flow Evaluation of the Venous Needle During Hemodialysis," *Journal of Biomechanical Engineering*, Vol. 127, Dec. 2005, pp. 1141-1146, doi:10.1115:1.2112927.

24. **Cheng, G.C.**, Koomullil, R.P., and Soni, B.K., "High Fidelity Field Simulations Using Density and Pressure Based Approaches," *Journal of Applied Numerical Mathematics on Applied Scientific Computing*, Vol. 55, Issue 3, Elsevier Science, 2005, pp. 264-282, doi:10.1016/j.apnum.2005.04.030.

25. **Cheng, G.C.**, and Farokhi, S., "On Turbulent Flows Dominated by Curvature Effects," *ASME Journal of Fluids Engineering*, Vol. 114, No. 1, 1992, pp. 52-57, doi:10.1115/1.2909999.

26. **Cheng, G.C.**, "Further Comments on New Eddy Viscosity Model for Computation of Swirling Turbulent Flows," *AIAA Journal*, Vol. 29, No. 6, 1991, pp. 1024-1025, doi:10.2514/3.59947.

Refereed Conference Papers:
1. Chang, C.L., Venkatachari, B.S., and **Cheng, G.C**., "Tetrahedral-Mesh Simulation of Turbulent Flows with the Space-Time Conservative Schemes," AIAA Paper 2015-3084, 45th AIAA Fluid Dynamics Conference, Dallas, TX, June 22-26, 2015, doi:10.2514/6.2015-3084.

2. Venkatachari, B.S., Mullane, M., **Cheng, G.C**., and Chang, C.L., "Numerical Study of Counterflowing Jet Effects on Supersonic Slender-Body Configurations," AIAA Paper 2015-3010, 33rd AIAA Applied Aerodynamics Conference, Dallas, TX, June 22-26, 2015, doi:10.2514/6.2015-3010.

3. Gu, B., Raghunath, P., and **Cheng, G.C**., Chen, Y.-S., Wu, J.-S., and Lin, M.C., "Kinetic Modeling of Hypergolic Ignition of N_2H_4-NTO Mixtures at Low Temperatures and the Sawyer-Glassman Experiment on Reactions of N_2H_4 with NO_x (x=1,2) at High Temperatures," 10th International Symposium on Special Topics in Chemical Propulsion, Poitiers, France, June, 2014.

4. Venkatachari, B.S., **Cheng, G.C**., Chang, C.L., Zichettello, B., and Bilyeu, D.L., "Long Penetration Mode Counterflowing Jets for Supersonic Slender Configurations- A Numerical Study," AIAA Paper 2013-2662, 31st AIAA Applied Aerodynamics Conference, San Diego, CA, June 24-27, 2013, doi:10.2514/6.2013-2662.

5. Chang, C.L., Venkatachari, B.S., and **Cheng, G.C**., "Time-Accurate Local Time Stepping and High-Order Space Time CESE Methods for Multi-Dimensional Flows Using Unstructured Meshes," AIAA Paper 2013-3069, 21st AIAA Computational Fluid Dynamics Conference, San Diego, CA, June 24-27, 2013, doi:10.2514/6.2013-3069.

6. Hung, C.-T., Lin, K.-M., Wu, J.-S., and **Cheng, G.C.**, "Development of a Parallel Fluid Modeling Code Considering EM Wave Effect," IEEE International Conference on Plasma Science, July, 2012, doi:10.1109/PLASMA.2012.6383376.

7. Wang, T.S., Lin, J., Ruf, J., Guidos, M., and **Cheng, G.C.**, "Effect of Coolant Flow Distribution on Transient Side Load of Film Cooled Nozzles," AIAA Paper 2011-3268, 41st AIAA Fluid Dynamics Conference and Exhibit, Honolulu, Hawaii, June 2011, doi:10.2514/6.2011-3268.

8. Saberimovahed, F., **Cheng, G.C.**, Venkatachari, B.S., and Cozmuta, I., "Atomistic simulation of thermal decomposition of crosslinked and non-crosslinked phenolic resin chains," AIAA Paper 2011-3786, 42nd AIAA Thermophysics Conference, Honolulu, Hawaii, June 2011, doi:10.2514/6.2011-3786.

9. Venkatachari, B.S., Ito, Y., **Cheng, G.C**., and Chang, C.L., "Numerical Investigation of the Interaction of Counterflowing Jets and Supersonic Capsule Flows," AIAA Paper 2011-4030, 42nd AIAA Thermophysics Conference, Honolulu, Hawaii, June 2011, doi:10.2514/6.2011-4030.

10. **Cheng, G.C.**, Koomullil, R.P., Ito, Y., Shih, A., Sittitavornwong, S., and Waite, P., "Numerical Study of Surgical Effects on Patients with Obstructive Sleep Apnea Syndrome Using Computational Fluid Dynamics," MASCOT10 Proceedings- Volume of IMACS Series in Computational and Applied Mathematics, Las Palmas de Gran Canaria, Spain, Oct. 20-22, 2010.

11. Venkatachari, B.S., **Cheng, G.C**., and Cozmuta, I., "Atomistic Modeling of the Decomposition of Charring Ablators," AIAA Paper 2010-4662, 2010, doi:10.2514/6.2010-4662.

12. **Cheng, G.C.**, Venkatachari, B.S., Chang, C.L., and Chang, S.C., "The Space-Time CESE Method for High-Fidelity Flow Simulations," Parallel Computational Fluid Dynamics Conference, Kaohsiung, Taiwan, May 17-21, 2010 (**Invited Speaker**).

13. **Cheng, G.C.**, Venkatachari, B.S., and Cozmuta, I., "Multi-scale Simulations of In-Depth Pyrolysis of Charring Ablative Thermal Protection Material," Parallel Computational Fluid Dynamics Conference, Kaohsiung, Taiwan, May 17-21, 2010.

14. Venkatachari, B.S., **Cheng, G.C.**, and Chang, S.C., "Development of a Higher Order CESE Scheme for Transient Viscous Flows," AIAA Paper 2009-3984, 2009, doi:10.2514/6.2009-3984.

15. **Cheng, G.C**., Nichols, R.H., Neroorkar, K.D., and Radhamony, P.G., "Validation and Assessment of Turbulence Transition Models," AIAA Paper 2009-1141, 2009, doi:10.2514/6.2009-1141.

16. Venkatachari, B.S., **Cheng, G.C.**, and Koomullil, R.P., "Uncertainty Analysis of Surface Ablation," AIAA Paper 2009-0261, 2009, doi:10.2514/6.2009-261.

17. Ramamoorthy, B., Koomullil, R.P., and **Cheng, G.C.**, "Numerical Simulation of Radiative Heat Transfer" AIAA Paper 2009-0671, 2009, doi:10.2514/6.2009-671.

18. Venkatachari, B.S., **Cheng, G.C.,** and Chang, S.C., "High-Fidelity Computational Aeroacoustics through CE/SE Based Transient Viscous Solver," AIAA Paper 2008-31, 2008, doi:10.2514/6.2008-31.

19. Venkatachari, B.S., **Cheng, G.C.**, Koomullil, R.P., and Ayasoufi, A., "Computational Tools for Re-Entry Aerothermodynamics: Part II - Surface Ablation," AIAA Paper 2008-1218, 2008, doi:10.2514/6.2008-1218.

20. Ramamoorthy, B., Koomullil, R.P., **Cheng, G.C.**, Rahmani, R.K., "Computational Tools for Re-Entry Aerothermodynamics: Part I - Non-Equilibrium Radiation," AIAA Paper 2008-1271, 2008, doi:10.2514/6.2008-1271.

21. **Cheng, G.C**., Ito, Y., Ross, D., Chen, Y.S., and Wang, T.S., "Numerical Simulations of Single Flow Element in a Nuclear Thermal Thrust Chamber," AIAA Paper 2007-4143, 2007, doi:10.2514/6.2007-4143.

22. Wang, T.S., Canabal, F., Chen, Y.S., and **Cheng, G.C**., "Multiphysics Computational Analysis of a Solid-Core Nuclear Thermal Engine Thrust Chamber," AIAA Paper 2007-4144, 2007, doi:10.2514/6.2007-4144.

23. **Cheng, G.C**., Neroorkar, K., Chen, Y.S., Wang, T.S., and Daso, E.O., "Numerical Study of Flow Augmented Thermal Management for Entry and Re-entry Environments," AIAA Paper 2007-4560, 2007, doi:10.2514/6.2007-4560.

24. Chang, C.L, Venkatachari, B.S., **Cheng, G.C.**, "Effect of Counterflow Jet on a Supersonic Reentry Capsule," AIAA Paper 2006-4776, 2006, doi:10.2514/6.2006-4776.

25. Ayasoufi, A., Rahmani, R.K., **Cheng, G.C**., Koomullil, R.P., and Neroorkar, K., "Numerical Simulation of Ablation for Reentry Vehicles," AIAA Paper 2006-2908, 2006, doi:10.2514/6.2006-2908.

26. Rahmani, R.K., Koomullil, R.P., Ayasoufi, A., and **Cheng, G.C**., "Finite Volume Method for Non-Equilibrium Radiative Heat Transfer Using Generalized Grid," AIAA Paper 2006-3782, 2006, doi:10.2514/6.2006-3782.

27. Wang, T.S., Canabal, F., **Cheng, G.C**., and Chen, Y.S., "Multiphysics Analysis of a Solid-Core Nuclear Thermal Engine Thrust Chamber," AIAA Paper 2006-2927, 9th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, June 5-8, 2006, doi:10.2514/6.2006-2927.

28. Wu**,** J.-S., Lian, Y.-Y., **Cheng, G.C.**, and Chen, Y.S., "Parallel Hybrid Particle-Continuum (DSMC-NS) Flow Simulations Using 3-D Unstructured Mesh," International Conference on Parallel CFD, Busan, KOREA, May 14-18, 2006 (**keynote speech**).

29. **Cheng, G.C**., and Chen, D.T., "A Chain-Reaction Approach to Model Gene Pathways," 3rd Annual Bioinformatics/Computational Biology Conference, Baton Rouge, Louisiana, Mar. 2-4, 2006.

30. Chen, D.T., Chen, J.J, Soong, S.J., **Cheng, G.C**., and Carroll, S.L., "An Integrated Bioinformatics Tool (IBT) to Classify Gene Functions in Microarray Data," 3rd Annual Bioinformatics/Computational Biology Conference, Baton Rouge, Louisiana, Mar. 2-4, 2006.

31. Koomullil, R.P., Noack, R.W., **Cheng, G.C**., Soni, B.K., Prewitt, N., "Moving Body Simulation Using Overset Framework with Rigid Body Dynamics", Proceedings of the 5th Meeting on Applied Scientific Computing and Tools Grid Generation, Approximation, Simulation and Visualization, Convento di San Domenico, Lecce, Italy, October 7-8, 2005.

32. Venkatachari, B., **Cheng, G.C.**, Chang, S.C., and Soni, B.K., "Validation and verification of Courant number insensitive CE/SE method for transient viscous flow simulations," Proceeding of the 5th Meeting on Applied Scientific Computing and Tools (MASCOT05)- a guest event in TCNCAE2005, Lecce, Italy October 3-7, 2005.

33. Venkatachari, B., **Cheng, G.C**., Chang, S.C., "Validation and Verification of CE/SE Method based Courant Number Insensitive Transient Viscous Flow Solver," AIAA Paper 2005-4356, 2005, doi:10.2514/6.2005-4356.

34. **Cheng, G.C**., Koomullil, R.P., and Noack, R.W., "A Library Based Overset Grid Development for Density- and Pressure-Based Flow Solvers", AIAA Paper 2005-5119, 2005, doi:10.2514/6.2005-5119.

35. Farmer, R.C., Pike, R., and **Cheng, G.C**., "CFD Analyses of Complex Flows," Proceeding of Symposium on Modeling of Complex Processes, Texas A&M University, March 2-3, 2005.

36. **Cheng, G.C**., and Farmer, R.C., "Development of Linearized Real-Fluid Model in Simulating Spray Combustion flows," AIAA Paper 2005-0735, 2005, doi:10.2514/6.2005-735.

37. Venkatachari, B., **Cheng, G.C**., Chang, S.C., "Courant Number Insensitive Transient Viscous Flow Solver Based on CE/SE Framework," AIAA Paper 2005-0093, 2005, doi:10.2514/6.2005-93.

38. Lian, Y.Y., Wu, J.-S., **Cheng, G.C**., and Koomullil, R.P., "Development of a Parallel Hybrid Method for the DSMC and NS Solver," AIAA Paper 2005-0435, 2005, doi:10.2514/6.2005-435.

39. **Cheng, G.C.**, Koomullil, R.P., and Soni, B.K., "Multidisciplinary & Multi-scale Computational Field Simulations- Algorithms and Applications", Presented at the MASCOT04, 4th Meeting on Applied Scientific Computing and Tools Grid Generation, Approximation and Visualization Facolta' di Ingegneria, Via S. Marta 3, Florence, Italy, Nov. 25-27, 2004.

40. Gunasekar, B. and **Cheng, G.C.**, "Design Evaluation of Biomass Gasification System Using Automated CFD Simulation With High Quality Conformal Surface Grid Generation," SECTAM-2004, Proceedings 22nd South Eastern Conference on Theoretical and Applied Mechanics, Aug. 15-17, 2004.

41. Venkataraman, R., Lian, Y.Y., Wu, J.S., **Cheng, G.C.**, and Koomullil, R., "Three-Dimensional Parallel DSMC Method for High-Speed Re-Entry Flow Simulations," Proceedings 22nd South Eastern Conference on Theoretical and Applied Mechanics, Aug. 15-17, 2004.

42. Venkatachari, B., **Cheng, G.C.**, Chang, S.C., "Development of a Transient Viscous Flow Solver Based on Conservation Element-Solution Element Framework," AIAA Paper 2004-3413, 2004, doi:10.2514/6.2004-3413.

43. Soni, B., **Cheng, G.C.**, Koomullil, R., Shih, A., Luke, E., and Thompson, D., "Enabling Computational Technologies for Aerothermodynamics Applicable to Next Generation Launch Vehicles," AIAA Paper 2004-3987, 2004, doi:10.2514/6.2004-3987.

44. **Cheng, G.C.**, and Farmer, R.C., "Development of Efficient Real-Fluid Model in Simulating Liquid Rocket Injector Flows," AIAA Paper 2003-4466, 2003, doi:10.2514/6.2003-4466.

45. **Cheng, G.C.**, Davis, R.R., Johnson, C.W., Muss, J.A., Greisen, D.A., and Cohn, R.K., "Development of GOX/Kerosene Swirl-Coaxial Injector Technology," AIAA Paper 2003-4751, 2003, doi:10.2514/6.2003-4751.

46. Muss, J.A., Johnson, C.W., **Cheng, G.C.**, and Cohn, R.K., "Numerical Cold Flow and Combustion Characterization of Swirl Coaxial Injector," AIAA-2003-0124, 2003, doi:10.2514/6.2003-124.

47. **Cheng, G.C.**, Johnson, C.W., Muss, J.A., and Cohn, R.K., "Swirl Coaxial Injector Development, Part II: CFD Modeling," 2002 JANNAF CS/APS/PSHS/MSS Joint Meeting, Destin, FL, April 2002.

48. **Cheng, G.C.**, and Farmer, R.C., "CFD Spray Combustion Model for Liquid Rocket Engine Injector Analyses," AIAA Paper 2002-0785, 2002.

49. Farmer, R.C., **Cheng, G.C.**, and Chen, Y.S., "CFD simulation of Liquid Rocket Engine Injectors: Test case RCM 1," Proceedings 2nd International Workshop on Rocket Combustion Modeling, Lampoldshausen, Germany, March 25-27, 2001.

50. Farmer, R.C., **Cheng, G.C.**, and Chen, Y.S., "CFD simulation of Liquid Rocket Engine Injectors: Test case RCM 2," Proceedings 2nd International Workshop on Rocket Combustion Modeling, Lampoldshausen, Germany, March 25-27, 2001.

51. Farmer, R.C., **Cheng, G.C.**, and Chen, Y.S., "CFD simulation of Liquid Rocket Engine Injectors: Test case RCM 3," Proceedings 2nd International Workshop on Rocket Combustion Modeling, Lampoldshausen, Germany, March 25-27, 2001.

52. Farmer, R.C., **Cheng, G.C.**, Trinh, H, and Tucker, K., "A Design Tool for Liquid Rocket Engine Injectors," AIAA Paper 2000-3499, 2000, doi:10.2514/6.2000-3499.

53. **Cheng, G.C.**, Anderson, P.G., and Farmer, R.C., "Development of CFD Model for Simulating Gas/Liquid Injectors in Rocket Engine," AIAA Paper 97-3228, 33rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit, July 6-9, 1997, doi:10.2514/6.1997-3228.

54. **Cheng, G.C.**, Chen, Y.S., and Wang, T.S., "Flow Distribution Within the SSME Main Injector Assembly Using Porosity Formulation," AIAA Paper 95-0350, AIAA 33rd Aerospace Sciences Meeting and Exhibit, Jan. 9-12, 1995, doi:10.2514/6.1995-350.

55. **Cheng, G.C.**, Farmer, R.C., and Chen, Y.S., "Numerical Study of Turbulent Flows with Compressibility Effect and Chemical Reactions," AIAA Paper 94-2026, 6th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, June 20-23, 1994, doi:10.2514/6.1994-2026.

56. **Cheng, G.C.**, Farmer, R.C., Jones, H.S., and McFarlane, J.S., "Numerical Simulation of the Internal Ballistics of a Hybrid Rocket Motor," AIAA Paper 94-0554, AIAA 32nd Aerospace Sciences Meeting and Exhibit, Jan. 10-13, 1994, doi:10.2514/6.1994-554.

57. **Cheng, G.C.**, Chen, Y.S., Garcia, R., and Williams, R.W., "Numerical Study of 3-D Inducer and Impeller for Pump Model Development," AIAA Paper 93-3003, AIAA 24th Fluid Dynamics Conference, July, 1993, doi:10.2514/6.1993-3003.

58. Chen, Y.S., **Cheng, G.C.**, and Farmer, R.C., "Reacting and Non-reacting Flow Simulation for Film Cooling in 2-D Supersonic Flows," AIAA Paper 92-3602, 28th AIAA Joint Propulsion Conference, July 1992, doi:10.2514/6.1992-3602.

Non-refereed Conference Papers:

1. Chou, T.-H., Wu, J.-S., Chen, Y.-S., and **Cheng, G.C.**, "Numerical Investigation of Flow Characteristics Past a Mixing Enhancer in a Single-Port Hybrid Combustion Chamber," 9th International Conference on Flow Dynamics (ICFD2012), Sendai, Japan, September 19-21, 2012.

2. Chuang, K.-M., Lin, J.-W., Wu, J.-S**.**, **Cheng, G.C**., and Chen, Y.-S. "Numerical and Experimental Study of Venturi Flow Meters for Nitrous Oxide," 9th International Conference on Flow Dynamics (ICFD2012), Sendai, Japan, September 19-21, 2012.

3. Lin, K.-M., Hu, M.-H., Hung, C.-T., Wu, J.-S., Hwang, F.-N., **Cheng, G.C.**, and Chen, Y.-S., "Hybrid Simulation of Gas Flow and Gas Discharge of Atmospheric-Pressure Plasma Jet with Helium Considering Impurity Effect," 9th International Conference on Flow Dynamics (ICFD2012), Sendai, Japan, September 19-21, 2012.

4. Chen, Y.-S., Chou, T.-H., Wu, J.-S., and **Cheng, G.C.**, "Sounding Rocket Development with Hybrid Combustion Technology," 9th International Conference on Flow Dynamics (ICFD2012), Sendai, Japan, September 19-21, 2012.

5. Chen, Y.-S., Chou, T.-H., Wu, J.-S., and **Cheng, G.C.**, "Numerical Investigation of a Dual Vortical Flow Hybrid Rocket Motor," 9th International Conference on Flow Dynamics (ICFD2012), Sendai, Japan, September 19-21, 2012.

6. **Cheng, G.C.**, Venkatachari, B., Chang, C.L., and Chang, S.C., "The Space-Time CESE Method for High-Fidelity Flow Simulations," Parallel Computational Fluid Dynamics Conference, Kaohsiung, Taiwan, May 2010.

INVITED SEMINARS/PRESENTATIONS (since 2000):

1. Seminar at UA AIAA student chapter, "*Research Activities of Computational Simulation Lab*," Oct. 28, 2014.

2. Seminar at NASA LaRC, "*Parametric Study of Counterflowing Jet Effects on Slender Bodies*," Sep. 26, 2014.

3. Seminar at Environmental Health Sciences Department, UAB, "*Interdisciplinary Research on Physics-Based Numerical Simulations of Bio and Environment Related Problems*," Nov. 28, 2012

4. Seminar at JAXA, "*CFD Study of Aeroacoustics, Spray Combustion, and Surface Ablation*," Chofu, Japan, Sep. 18, 2012.

5. Seminar at Mechanical Engineering Dept., National Chaio Tung University, "*Research, Development & Applications at CSLab-- Status & Future*," Hsin-Chu, Taiwan, March 22, 2012

6. UAB Physics Colloquium, "*Physics-Based Multi-Scale Simulations of In-Depth Pyrolysis of Charring Ablator*," Sep. 9, 2011.

7. Seminar at National Cheng-Kung University, "*Numerical Simulations of Multi-phase Combustion and Hypersonic Aerothermodynamics*," Tainan, Taiwan, May 2010.

8. Parallel Computational Fluid Dynamics Conference, "*The Space-Time CESE Method for High-Fidelity Flow Simulations*," Kaohsiung, Taiwan, May 2010.

9. Complex Physics Prediction Workshop at Wright-Patterson Air Force Base, "*Assessment and Improvement of Turbulence Transition Models*," Aug. 2009.

10. PET Workshop at Arnold Engineering Development Center, "*Assessment and Improvement of Turbulence Transition Models*," May 2009.

11. AFOSR/NASA/SNL Technical Interchange Meeting: Ablator Modeling, "*Numerical Simulation of Pyrolysis Process Associated with TPS*," Santa Fe, New Mexico, Apr. 2009.

12. PET Seminar at Wright-Patterson Air Force Base, "*Validation and Assessment of Turbulence Transition Models*," June 2008.

13. PET Seminar at Arnold Engineering Development Center, "*Validation and Assessment of Turbulence Transition Models*," May 2008.

14. Seminar at NASA Glenn Research Center, "*Computations of Acoustic Waves of Turbomachinery and Jet Flows*," Oct. 2007.

15. 1st Taiwan-US Workshop on CE/SE Method, "*Validation and Verification of Space-Time CE/SE Method in Simulating Unsteady Viscous Fluid Flows*," Hsinchu, Taiwan, Aug. 2007.

16. Seminar at Institute of Mathematical Modeling and Scientific Computing, National Chiao-Tung University, "*Computational Fluid Dynamics Simulations: Current Status & Future Challenges*," Hsinchu, Taiwan, Aug. 2007.

17. CFD Tools and Technology Workshop, "*Numerical Simulations of Chemically Reacting Flow: Challenges and Approaches*," Aberdeen, MD, Mar. 2007.

18. PET Workshop at U.S. Naval Air Warfare Center/Weapons Division, "*CFD Research, Development & Application--Activities & Future Direction at UAB*," China Lake, CA, Nov. 2006.

19. PET Workshop at U.S. Air Force Research Laboratory/PRSE, "*Challenges of Simulating Chemically Reacting Flows Involving Multi-Phase Effect and Instability*," Edwards Air Force Base, CA, Nov. 2006.

20. PET Workshop at U.S. Air Force Research Laboratory/VAAC, "*Challenges of External Aerothermodynamics of Flows around Entry & Reentry Vehicles*," Wright-Patterson Air Force Base, OH, Sep. 2006.

21. PET Workshop at U.S. Air Force Research Laboratory/PRTC, "*Challenges of Simulating Chemically Reacting Flows Involving Multi-Phase Effect and Instability*," Wright-Patterson Air Force Base, OH, Sep. 2006.

22. PET Workshop at U.S. Naval Surface Warfare Center/Carderock Division, "*Numerical Simulation of Multi-disciplinary, Complex-Physics Flows: Challenges and Approaches*," W. Bethesda, MD, Aug. 2006.

23. NASA Glenn Research Center, "*CFD Research, Development & Application-- Activities & Future Direction at UAB*," Cleveland, OH, Aug. 2006.

24. PET Workshop at U.S. Army Research Laboratory, "*Numerical Simulation of Multi-disciplinary, Complex-Physics Flows*," Aberdeen Proving Ground, MD, May 2006.

25. PET Workshop at Arnold Engineering Development Center, "*Multi-phase, Multi-species Chemically Reacting Flow: Challenges and Approaches*," Arnold Air Force Base, TN, May 2005.

26. Seminar at Northrop-Grumman Space Technology Co., "*Overview-- Computational Simulation Program at UAB*," Redondo Beach, CA, July 2004.

27. Gas Technology Institute, "*Overview-- High-Fidelity Computational Field Simulations at UAB*," Chicago, IL, Sep. 2004.

28. NASA MSFC Fluid Workshop, "*Status of Efficient Real-Fluid Model Development*," Birmingham, AL, Apr. 2003.

29. Wright Patterson Air Force Base; "*Numerical Simulation of Multi-Phase Reacting Flows,*" Dayton, OH; Mar. 2003.

30. Northrop Grumman Space Technology, "*Numerical Simulation of Multi-Phase Reacting Flows*," Redondo Beach, CA, Mar. 2003.

31. Rocketdyne, Boeing Co., "*Numerical Simulation of Multi-Phase Reacting Flows*," Thousand Oaks, CA, Mar. 2003.13th Propulsion Engineering Research Center Symposium, "*Numerical Simulation of Real Fluid Properties with Ideal Fluid Model*," Huntsville, AL, Oct. 2001.

Graduate Degrees Directed:

1. Pradeep Sapkota; Ph.D. in Aerospace Engineering and Mechanics Dept., UA; (work in progress)
   Project topic: *Investigation of the Space-Time CESE Method with CPU-GPU computing*

2. Timothy Whitehead; M.S. in Aerospace Engineering and Mechanics Dept., UA; 2014-2016
   Project topic: *Numerical Study of Rotating Detonation Engines*

3. Erik G. Winaldi; Ph.D. in Interdisciplinary Engineering; 2011-2013
   Project Title: *Uncertainty Analysis of Surface Ablation Model and its Integration with CFD Solver for Reentry Aerothermodynamics*

4. Farshad Saberi Movahed; M.S. in Mechanical Engineering; 2011
   Project Topic: *Atomic Simulations of Thermal Decomposition of Charring Ablators*

5. Theodore G. Benjamin; M.S. in Mechanical Engineering; 2011
   Project topic: *Development Numerical Study of the Dynamic Behavior of a Hydraulic Engine Mount*

6. Balaji Shankar Venkatachari; Ph.D. in Interdisciplinary Engineering; 2010
   Dissertation Title: *Investigation of the CE-SE Framework for Viscous Flows*

7. Joseph Thompson; in Mechanical Engineering; (Incomplete)
   Thesis topic: *Computational Study of Dynamic Stability for A Subsonic Transport Configuration with Airframe Damage*

8. Ramprasad Venkataraman; M.S. in Mechanical Engineering; 2007
   Thesis Topic: *Extending the Parallel 3-D DSMC Code to Physical Vapor Deposition Simulations*

9. Phong B Le; M.S. in Mechanical Engineering; 2006
   Project topic: *Development of a GUI-Based Finite-Rate Chemistry Numerical Module*

10. Diego Andrade; M.S. in Mechanical Engineering; 2005
    Thesis Title: *Mathematical Model and Numerical Simulation of a Proton Exchange Membrane Fuel Cell*

11. Balaji Shankar Venkatachari; M.S. in Mechanical Engineering; 2005
    Thesis Title: *Development and Validation of a Transient Viscous Flow Solver Based on a Space-Time CE-SE Framework*

12. Matthew N Radman; M.S. in Mechanical Engineering; 2005
    Thesis Title: *Numerical Study of Flow Instability in Shear Coaxial Injectors*

13. Bharath Gunasekar; M.S. in Mechanical Engineering; 2004
    Thesis Title: *Design Evaluation of Biomass Gasification System Using Automated CFD Simulation with High Quality Conformal Surface Grid Generation*

Post-doctoral Fellows/Research Associates Advised:

1. Balaji Shankar Venkatachari, post-doctorate fellow (2010-2013), and Research Associate (2013-present)
   Project Titles:
   a) *Development of Space-Time CESE Algorithms and Software Framework for High Fidelity Flow Simulations Using Unstructured Meshes*
   b) *Numerical Study of Mitigation of Sonic Boom using Long Penetration Mode Counter-Flowing Jets*
   c) *Support of EZ4D Development for High-Fidelity Hypersonic Computation*
   d) *Higher-Order CESE Schemes for Performance of Simulations of Blast-Wave and High-Energy Acoustic Propagation in Complex Geometries*

2. Anahita Ayasoufi, post-doctorate fellow, 2005-2007
   Project Title:
   a) *Development of a numerical solver for simulating the surface ablation of re-entry vehicles*
   b) *Development of a high-fidelity computational fluid dynamics solver based on a space-time conservation element/solution element numerical framework*

3. Yu-Young Lian, Ph.D. student, Visiting Ph.D. student, 2003-2004
   Project Title: *Development of an Efficient Hybrid DSMC/Navier-Stokes Method towards a Unified Flow Solver*

Undergraduate Senior Design Projects Advised:

1. "Micro Aerial Vehicle," 08/2010-05/2011
2. "Cupola Heat Exchanger," 08/2009-05/2010