

SERHAT HOSDER, PhD

Professor of Aerospace Engineering

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I. Education & Degrees

PhD in Aerospace Engineering, December 2004

Virginia Tech, Blacksburg, VA

Advisor: Prof. Bernard Grossman **GPA:** 4.0/4.0

M.Sc. in Aerospace Engineering, June 2001

Virginia Tech, Blacksburg, VA

Advisor: Prof. Roger L. Simpson **GPA:** 4.0/4.0

B.Sc. in Aeronautical Engineering, June 1997

Istanbul Technical University, Istanbul, Turkey

II. Research Areas of Interest

Computational aerothermodynamics, hypersonic flows and technologies, uncertainty quantification, directed energy, planetary entry/descent/landing of spacecraft, aerodynamic shape optimization, robust design, numerical methods.

III. Professional Positions

Professor of Aerospace Engineering

Mechanical & Aerospace Engineering Department, Missouri S&T, Rolla, MO (Sept. 2019 to date)

Associate Professor of Aerospace Engineering

Mechanical & Aerospace Engineering Department, Missouri S&T, Rolla, MO (Sept. 2013 to Aug. 2019)

Assistant Professor of Aerospace Engineering

Mechanical & Aerospace Engineering Department, Missouri S&T, Rolla, MO (Aug. 2007 to Aug. 2013)

Postdoctoral Associate

Aerospace & Ocean Engineering Department, Virginia Tech, Blacksburg, VA (Jan. 2005 – Aug. 2007)

Principal Research Engineer

Techsburg Inc., Blacksburg VA (August 2004 - January 2005)

Graduate Research Assistant

Aerospace & Ocean Engineering Department, Virginia Tech, Blacksburg, VA (Aug. 1998 – Aug. 2004)

IV. Awards and Honors

- 2021 AIAA International Space Planes and Hypersonic Systems & Technologies Best Student Paper
- Missouri S&T Outstanding Faculty for Contributions to Graduate Studies Award (2022)
- Fellow of the Royal Aeronautical Society (2021)
- NASA Langley Research Center Henry J. E. Reid Award, 2nd place (2018)
- Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA) (Jan. 2017)
- Missouri S&T Faculty External Recognition Award (2017)
- Missouri S&T Faculty Research Award (2015)
- Missouri S&T Faculty Research Award (2012)
- 1st rank in the graduating class of Aeronautical Engineering, Istanbul Technical University in 1997

V. Summary of Research Activities

V.1. Professor of Aerospace Engineering

Mechanical and Aerospace Engineering Department, Missouri S&T, Rolla, MO (Sept. 2007 to date)

As a Professor of Aerospace Engineering and the Director of Aerospace Simulations Laboratory (ASL) at Missouri S&T, my research group's activities focus on the fields of computational aerodynamics/aerothermodynamics, multi-fidelity modeling, uncertainty quantification and reduction of hypersonic flows and technologies, directed energy radiation interaction with hypersonic applications, aerothermochemistry of particle-laden compressible flows, computational fluid dynamics (CFD), planetary entry/descent/landing of spacecraft, and aerodynamic shape optimization. Our research (amounting \$3.6M awards to date with 100% shared credit) has been funded/supported by DoD Joint Hypersonics Transition Office (JHTO), NASA, Missile Defense Agency, NSF and industry. These research activities have resulted in over 110 refereed publications co-authored by me and my students, who have received prestigious fellowships including 3 NASA Space Technology Research Fellowships (NSTRF), 3 NASA Pathways Internships, 1 Amelia Earhart Fellowship, and various awards from the university during their graduate studies. The graduated students currently work for NASA, Sandia National Labs, and industry including Boeing, SpaceX, Caterpillar Inc., and Corning, Inc.

IV.2. Postdoctoral Research Associate

Department of Aerospace & Ocean Engineering, Virginia Polytechnic Institute and State University (from January 2005 to August 2007)

IV.3. Principal Research Engineer

Techsburg Inc., Blacksburg VA (from August 2004 to January 2005)

IV.4. Graduate Research Assistant

Department of Aerospace & Ocean Engineering, Virginia Polytechnic Institute and State University (from August 1998 to August 2004)

VI. Publications

- Google Scholar Profile: <https://scholar.google.com/citations?user=7YbzL0sAAAAJ&hl=en>

VI.1. Journal Papers

(* indicates students supervised at Missouri S&T)

J44. A. Hinkle*, **S. Hosder**, and C. Johnston, "Efficient Solution of Surface Erosion in Particle-Laden Hypersonic Flows," *Journal of Spacecraft and Rockets*, Vol. 59, No. 6, (2022), pp. 2114-2128.

J43. A. Vuruskan* and **S. Hosder**, "Impact of Turbulence Models and Objective Function on Three-Dimensional Robust Aerodynamic Optimization," *Journal of Aircraft*, Vol. 59, No. 5, (2022), pp. 1221-1242.

J42. M. Santos*, **S. Hosder**, and T. West, "Multifidelity Heating Prediction of Adaptable, Deployable Entry Placement Technology Vehicles," *Journal of Spacecraft and Rockets*, Vol. 59, No. 3, (2022), pp. 1001-1015.

J41. R. Sharma* and **S. Hosder**, "Investigation of Mission-Driven Inverse Aircraft Design Space Exploration with Machine Learning", *Journal of Aerospace Information Systems*, Vol. 18, No. 11, (2021), pp. 774-789.

J40. M. Di Stefano*, **S. Hosder** and R. Baurle, "Effect of Turbulence Model Uncertainty on Scramjet Strut Injector Flow Field Analysis ", *Computers and Fluids*, Vol. 229, (2021), pp. 105104.

J39. M. Santos*, **S. Hosder** and T. West, "Multi-Fidelity Turbulent Heating Prediction of Hypersonic Inflatable Aerodynamic Decelerators with Surface Scalloping", *Journal of Spacecraft and Rockets*, Vol. 58, No. 5, (2021), pp. 1325-1338.

J38. A. Erb* and **S. Hosder**, "Analysis and Comparison of Turbulence Model Coefficient Uncertainty for Canonical Flow Problems", *Computers and Fluids*, Vol. 227, (2021), pp. 105027.

J37. M. Santos*, **S. Hosder** and T. West, "Multi-Fidelity Modeling for Efficient Aerothermal Prediction of Deployable Entry Vehicles", *Journal of Spacecraft and Rockets*, Vol. 58, No. 1, (2021), pp. 110-123.

J36. A. Erb* and **S. Hosder**, "Analysis of Turbulence Model Uncertainty for Shock Wave-Boundary Layer Interaction Simulations", *Journal of Spacecraft and Rockets*, Vol. 57, No. 6, (2020), pp. 1264-1283.

J35. M. Di Stefano*, **S. Hosder** and R. Baurle, "Effect of Turbulence Model Uncertainty on Scramjet Isolator Flow Field Analysis", *Journal of Propulsion and Power*, Vol. 36, No. 1, (2020), pp. 109-122.

J34. P. Friz*, B. Leser, B. Towle, and **S. Hosder**, "Blind Validation Study of Parametric Cost Estimation Tool SEER-H for NASA Space Missions", *Acta Astronautica*, Vol. 166, (2020), pp. 358-368.

J33. A. Brune*, T. West* and **S. Hosder**, "Uncertainty Quantification of Planetary Entry Technologies", *Progress in Aerospace Sciences*, Vol. 111, (2019), pp. 100574.

J32. P. Friz*, J. Samareh and **S. Hosder**, "New Method for Systems and Cost Analysis of Human Mars Entry Vehicles", *Journal of Spacecraft and Rockets*, Vol. 56, No. 6, (2019), pp. 1742-1756.

- J31.** A. Vuruskan* and **S. Hosder**, “Impact of Turbulence Models and Shape Parameterization on Robust Aerodynamic Shape Optimization”, *Journal of Aircraft*, Vol. 56, No. 3, (2019), pp. 1099-1115.
- J30.** A. Brune*, **S. Hosder**, D. Campbell, S. Gulli and L. Maddalena, “Numerical Analysis of an Actively-Cooled Low-Reynolds Number Hypersonic Diffuser,” *Journal of Thermophysics and Heat Transfer*, Vol. 33, No.1, (2019), pp. 32-48.
- J29.** J. Schaefer*, A. Cary, M. Mani, J. Krakos, and **S. Hosder**, “Grid Influence on Turbulence Model Coefficient Uncertainties in Transonic Wall-Bounded Flows,” *AIAA Journal*, Vol. 56, No. 8, (2018), pp. 3123-3137.
- J28.** T. West*, C. Johnston, **S. Hosder**, “Uncertainty and Sensitivity Analysis of Afterbody Radiative Heating Predictions for Earth Entry,” *Journal of Thermophysics and Heat Transfer*, Vol. 31, No. 2, (2017), pp. 294-306. (NASA Langley Henry J. E. Reid Award)
- J27.** A. Brune*, **S. Hosder**, K. Edquist, and S. Tobin, “Thermal Protection System Response Uncertainty of a Hypersonic Inflatable Aerodynamic Decelerator,” *Journal of Spacecraft and Rockets*, Vol. 54, No. 1, (2017), pp. 141-154.
- J26.** J. Schaefer*, **S. Hosder**, T. West*, C. Rumsey, J. Carlson, and W. Kleb, “Uncertainty Quantification of Turbulence Model Closure Coefficients for Transonic Wall-Bounded Flows,” *AIAA Journal*, Vol. 55, No. 1, (2017), pp. 195-213.
- J25.** A. Brune*, **S. Hosder**, and K. Edquist, “Uncertainty Analysis of Fluid-Structure Interaction of a Deformable Hypersonic Inflatable Aerodynamic Decelerator,” *Journal of Spacecraft and Rockets*, Vol. 53, No. 4, (2016), pp. 654-668.
- J24.** T. West*, A. Brune*, **S. Hosder**, and C. Johnston, “Uncertainty Analysis of Radiative Heating Predictions for Titan Entry,” *Journal of Thermophysics and Heat Transfer*, Vol. 30, No. 2, (2016), pp: 438-451.
- J23.** H. Shah*, **S. Hosder**, L. Leifsson, S. Koziel, and Y. Tesfahunegn, “Multi-fidelity Robust Aerodynamic Design Optimization Under Mixed Uncertainty,” *Aerospace Science and Technology*, Vol. 45, (2015), pp. 17-29.
- J22.** A. Brune*, T. West*, **S. Hosder**, and K. Edquist, “Uncertainty Analysis of Mars Entry Flows over a Hypersonic Inflatable Aerodynamic Decelerator,” *Journal of Spacecraft and Rockets*, Vol. 52, No. 3, (2015), pp. 776-788.
- J21.** H. Shah*, **S. Hosder**, and T. Winter, “Quantification of Margins and Mixed Uncertainties Using Evidence Theory and Stochastic Expansions,” *Reliability Engineering and System Safety*, Vol.138, (2015), pp. 59-72.
- J20.** H. Shah*, **S. Hosder**, and T. Winter, “A Mixed Uncertainty Quantification Approach with Evidence Theory and Stochastic Expansions,” *International Journal for Uncertainty Quantification*, Vol. 5, No. 1, (2015), pp. 21-48.
- J19.** T. West*, **S. Hosder**, and T. Winter, “Quantification of Margins and Uncertainties for Integrated Spacecraft Systems Models,” *Journal of Spacecraft and Rockets*, Vol. 52, No. 2, (2015), pp. 450-461.

- J18.** T. West* and **S. Hosder**, “Uncertainty Quantification of Hypersonic Reentry Flows using Sparse Sampling and Stochastic Expansions,” *Journal of Spacecraft and Rockets* Vol. 52, No. 1, *Special Section on Numerical Simulation of Hypersonic Flows*, (2015), pp. 120-133
- J17.** A. Brune*, **S. Hosder**, S. Gulli, and L. Maddalena “Variable Transpiration Cooling Effectiveness in Laminar and Turbulent Flows for Hypersonic Vehicles,” *AIAA Journal*, Vol. 53, No. 1, (2015), pp. 176-189.
- J16.** D. Han* and **S. Hosder**, “Inherent and Epistemic Uncertainty Analysis for CFD Simulation of Synthetic Jet Actuators,” *International Journal for Uncertainty Quantification*, Vol. 4, No. 6, (2014), pp. 511-533.
- J15.** S. Gulli, L. Maddalena, A. Brune*, and **S. Hosder**, “Integrated Analysis of Reusable TPS Based on Variable Transpiration Cooling,” *Journal of Spacecraft and Rockets*, Vol. 51, No. 2, (2014), pp. 412-423.
- J14.** T. West*, **S. Hosder**, and C. Johnston, “Multi-Step Uncertainty Quantification Approach Applied to Hypersonic Reentry Flows,” *Journal of Spacecraft and Rockets*, Vol. 51, No. 1, (2014), pp. 296-310.
- J13.** S. Gulli, L. Maddalena, and **S. Hosder**, “Variable Transpiration Cooling for the Thermal Management of Reusable Hypersonic Vehicles,” *Aerospace Science and Technology*, Vol. 29, No. 1, (2013), pp. 434-444.
- J12.** Y. Zhang* and **S. Hosder**, “Robust Design Optimization Under Mixed Uncertainties with Stochastic Expansions,” *ASME Journal of Mechanical Design*, Vol. 135, 081005, (August 2013).
- J11.** T. West* and **S. Hosder**, “Numerical Investigation of Plasma Actuator Configurations for Flow Separation Control at Multiple Angles of Attack,” *International Journal of Flow Control*, Vol. 5, No. 1, (March 2013).
- J10.** **S. Hosder** and B. Bettis*, “Uncertainty and Sensitivity Analysis for Reentry Flows under Inherent and Model-Form Uncertainties,” *Journal of Spacecraft and Rockets*, Vol. 49, No. 2, (2012), pp. 193-206.
- J9.** **S. Hosder**, “Stochastic Response Surfaces Based on Non-Intrusive Polynomial Chaos for Uncertainty Quantification”, *International Journal of Mathematical Modeling and Numerical Optimization*, Vol. 3, No. 1/2, (2012), pp. 117-139.
- J8.** B. Bettis* and **S. Hosder**, “Efficient Uncertainty Quantification Approach for Reentry Flows with Mixed Uncertainties,” *Journal of Thermophysics and Heat Transfer*, Vol. 25, No. 4, (2011), pp. 523-535.
- J7.** S. Adya*, D. Han*, and **S. Hosder**, “Uncertainty Quantification Integrated to CFD Modeling of Synthetic Jet Actuators,” *International Journal of Flow Control*, Vol. 2, No. 3, (2010), pp. 167-179.
- J6.** **S. Hosder**, R. W. Walters, aM. Balch, "Point-Collocation Non-Intrusive Polynomial Chaos Method for Stochastic Computational Fluid Dynamics", *AIAA Journal*, Vol. 48, No. 12, (2010), pp. 2721-2730.
- J5.** **S. Hosder**, B. Grossman, J. A. Schetz, W. H. Mason, and R. T. Haftka, “Computational-Fluid-Dynamics-Based Clean-Wing Aerodynamic Noise Model for MDO”, *Journal of Aircraft*, Vol. 47, No. 3, (2010), pp. 754-762.

J4. J. Schetz, **S. Hosder**, V. Dippold, J. Walker, “Propulsion and Aerodynamic Performance Evaluation of Jet-Wing Distributed Propulsion,” *Aerospace Science and Technology*, Volume 14, No. 1, (2010), pp. 1-10.

J3. **S. Hosder** and R. L. Simpson, “An Experimental Investigation of Unsteady Flow Separation on A Maneuvering Axisymmetric Body,” *Journal of Aircraft*, Vol. 44, No. 4, (2007), pp. 1286-1295.

J2. **S. Hosder**, B. Grossman, R. T. Haftka, W. H. Mason, and L. T. Watson, “Quantitative Relative Comparison of CFD Simulation Uncertainties for a Transonic Diffuser Problem,” *Computers & Fluids*, Vol. 35, No. 10, (2006), pp. 1444-1458.

J1. **S. Hosder**, L. T. Watson, B. Grossman, W. H. Mason, H. Kim, R. T. Haftka and S. E. Cox, “Polynomial Response Surface Approximations for the Multidisciplinary Design Optimization of a High Speed Civil Transport,” *Optimization and Engineering*, Vol. 2, No. 4, (2001), pp. 431–452.

VI.2. Book Chapters

BC3. T. West* and **S. Hosder**, “Chapter 3: Efficient Uncertainty Analysis of Radiative Heating for Planetary Entry,” *Uncertainty Quantification in Computational Science: Theory and Application in Fluids and Structural Mechanics*, Edited by S. Sarkar, World Scientific Publishing, (2016), pp. 63-90

BC2. Y. Zhang* and **S. Hosder**, “Efficient Robust Design with Stochastic Expansions,” *Surrogate-Based Modeling and Optimization-Applications in Engineering* co-edited by S. Koziel and L. Leifsson, pp: 247-284, ISBN 978-1-4614-7550-7, ISBN 978-1-4614-7551-4 (eBook), DOI 10.1007/978-1-4614-7551-4_11, Springer 2013.

BC1. V. Birman, T. Keil, and **S. Hosder**, “Chapter 6: Functionally Graded Materials in Engineering,” *Structural Interfaces and Attachments in Biology* co-edited by S. Thomopoulos G.M. Genin and V. Birman, Springer 2013.

VI.3. Publications in Refereed Conference Proceedings:

(CP39, CP28, CP17 & CP14: invited papers, CP65: Best Paper)

CP67. A. Hinkle*, **S. Hosder**, and C. Johnston, "Efficient Two-Way Coupled Analysis of Steady-State Particle-Laden Hypersonic Flows," AIAA Paper 2022-3950, AIAA AVIATION 2022, Chicago, IL, June 2022.

CP66. A. Hinkle*, **S. Hosder**, and C. Johnston, "Efficient Solution of Surface Erosion in Particle-Laden Hypersonic Flows," AIAA Paper 2021-4229, AIAA ASCEND 2021, Las Vegas, NV, Nov. 2021.

CP65. M. Santos*, T. West, and **S. Hosder**, “Aerothermal Uncertainty Quantification of Deployable Entry Technologies Using Multi-Fidelity Modeling,” AIAA Paper 2021- 4228, AIAA ASCEND 2021, Las Vegas, NV, Nov. 2021 (**2021 AIAA International Space Planes and Hypersonic Systems & Technologies Best Student Paper Award**)

CP64. M. Santos*, T. West, and **S. Hosder**, “Multi-Fidelity Heating Prediction of Adaptable, Deployable Entry Placement Technology Vehicles,” AIAA Paper 2021-1632, AIAA SciTech 2021 Forum (Virtual), January 2021.

CP63. A. Vuruskan* and **S. Hosder**, “Impact of Turbulence Models on Robust Aerodynamic Shape Optimization of 3-D Wing Geometries,” AIAA Paper 2021-0339, AIAA SciTech 2021 Forum (Virtual), January 2021.

CP62. R. Sharma* and **S. Hosder**, “Investigation of Aircraft Design Space Exploration with Machine Learning,” AIAA Paper 2021-0114, AIAA SciTech 2021 Forum (Virtual), January 2021.

CP61. M. Santos*, T. West, and **S. Hosder**, “Multi-Fidelity Turbulent Heating Prediction of Hypersonic Inflatable Aerodynamic Decelerators with Surface Scalloping” 2020 AIAA Aviation Forum, Paper No. 2020-2724, June 2020.

CP60. M. Di Stefano*, **S. Hosder**, and R. Baurle, “Effect of Turbulence Model Uncertainty on Scramjet Strut Injector Flow Field Analysis,” AIAA Paper 2020-2457, 23rd AIAA International Space Planes and Hypersonic Systems and Technologies Conference, Montreal, Canada, 2020.

CP59. A. Vuruskan* and **S. Hosder**, “Effect of Turbulence Models on Aerodynamic Optimization of 3-D Wing Geometries,” 2019 AIAA Aviation Forum, Paper No. 2019-3174, Dallas, Texas, June 2019.

CP58. M. Di Stefano*, **S. Hosder**, and R. Baurle, “The Effect of Turbulence Model Uncertainty on Scramjet Isolator Flow Field Analysis,” 22nd AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2018-5262, Orlando, FL, Sept. 2018.

CP57. A. Erb* and **S. Hosder**, “Investigation of Turbulence Model Uncertainty for Supersonic/Hypersonic Shock Wave-Boundary Layer Interaction Predictions,” 22nd AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2018-5195, Orlando, FL, Sept. 2018.

CP56. M. Santos*, A. Hinkle*, **S. Hosder**, and T. West, “Multi-Fidelity Modeling for Efficient Aerothermal Prediction of Deployable Re-Entry Vehicles,” 22nd AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2018-5268, Orlando, FL, Sept. 2018.

CP55. Paul Friz*, J. Klovstad, B. Leser, B. Towle and **S. Hosder**, “Blind Study Validating Parametric Costing Tools PRICE TruePlanning and SEER-H for NASA Science Missions,” 2018 AIAA Space Forum, Paper No. 2018-5178, Orlando, FL, Sept. 2018.

CP54. P. Friz*, J. Samareh, and **S. Hosder**, “An Agile Cost Modeling Approach for Entry Systems Analysis of Human Mars Missions,” 2018 AIAA Space Forum, Paper No. 2018-5177, Orlando, FL, Sept. 2018.

CP53. A. Erb* and **S. Hosder**, “Uncertainty Analysis of Turbulence Model Closure Coefficients for Shock Wave-Boundary Layer Interaction Simulations,” 2018 AIAA SciTech Forum, Paper No. 2018-2077, Kissimmee, Florida, January 2018.

CP52. A. Vuruskan* and **S. Hosder**, “Investigation of the Impact of Turbulence Models on Robust Aerodynamic Shape Optimization,” 2018 AIAA SciTech Forum, Paper No. 2018-0553, Kissimmee, Florida, January 2018.

CP51. A. Vuruskan* and **S. Hosder**, “Investigation of the Effectiveness of Selected Shape Parameterization Techniques for Robust Aerodynamic Optimization,” 35th AIAA Applied Aerodynamics Conference, 2017 Aviation Forum, Paper No. 2017-4082, Denver, CO, June 2017.

CP50. A. Brune*, **S. Hosder**, D. Campbell, S. Gulli, and L. Maddalena, “Numerical Analysis of an Actively-Cooled Low-Reynolds Number Hypersonic Diffuser,” 21st AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2017-2363, Xiamen, China, March 2017.

CP49. A. Brune*, T. West*, **S. Hosder**, and K. Edquist, “A Review of Uncertainty Analysis for Hypersonic Inflatable Aerodynamic Decelerator Design,” 21st AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2017-2373, Xiamen, China, March 2017.

CP48. A. Erb* and **S. Hosder**, “Uncertainty Analysis of Turbulence Model Closure Coefficients for Wall-Bounded Attached and Separated Flows,” 2017 AIAA SciTech Forum, Paper No. 2017-1952, Grapevine, TX, 9-13 January 2017.

CP47. A. Brune*, **S. Hosder**, and K. Edquist, “Uncertainty Analysis of Thermal Protection System Response of a Hypersonic Inflatable Aerodynamic Decelerator,” 46th AIAA Thermophysics Conference, Paper No. AIAA-2016-3535, Washington, D. C., June 2016.

CP46. J. Schaefer*, **S. Hosder**, M. Mani, A. Cary, and J. Krakos, “The Effect of Grid Topology and Flow Solver on Turbulence Model Closure Coefficient Uncertainties for a Transonic Airfoil,” 46th AIAA Fluid Dynamics Conference, Paper No. AIAA 2016-4400, Washington, D. C., June 2016.

CP45. T. West*, C. Johnston, **S. Hosder**, “Uncertainty and Sensitivity Analysis of Afterbody Radiative Heating Predictions for Earth Entry,” 54th AIAA Aerospace Sciences Meeting (SciTech 2016), Paper No. AIAA 2016-0738, San Diego, CA., January 2016.

CP44. A. Brune*, **S. Hosder**, and K. Edquist, “Uncertainty Analysis of Fluid-Structure Interaction of a Deformable Hypersonic Inflatable Aerodynamic Decelerator,” 20th AIAA International Space Planes & Hypersonic Systems & Technologies Conference, Paper No. 2015-0917, Glasgow, Scotland, July 2015.

CP43. J. Schaefer*, T. West*, **S. Hosder**, C. Rumsey, J. Carlson, and W. Kleb, “Uncertainty Quantification of Turbulence Model Closure Coefficients for Transonic Wall-Bounded Flows,” 22nd AIAA Computational Fluid Dynamics Conference, Paper No. AIAA 2015-2461, Dallas, TX, June 2015.

CP42. H. Shah*, **S. Hosder**, L. Leifsson, S. Koziel, and Y. Tesfahunegn, “Multi-fidelity Robust Aerodynamic Design Optimization Under Mixed Uncertainty,” 17th AIAA Non-Deterministic Approaches Conference (SciTech 2015), Paper No. AIAA-2015-0917, Kissimmee, FL, Jan. 2015.

CP41. L. Leifsson, S. Koziel, and **S. Hosder**, “Multi-Objective Aeroacoustic Shape Optimization by Variable-Fidelity Models and Response Surface Surrogates,” 53rd AIAA Aerospace Sciences Meeting (SciTech 2015), Paper No. AIAA-2015-1800, Kissimmee, FL, Jan. 2015.

CP40. Y. Tesfahunegn, S. Koziel, J. Gramanzini*, **S. Hosder**, Z. Han, and L. Leifsson, “Application of Direct and Surrogate-Based Optimization to Two-Dimensional Aerodynamic Problems: A Comparative Study,” 53rd AIAA Aerospace Sciences Meeting, Paper No. 2015-0265, Kissimmee, FL, Jan. 2015.

CP39. T. West*, A. Brune*, and **S. Hosder**, “Uncertainty Analysis of Radiative Heating for Multiple Planetary Entry Cases (**Invited**)”, 19th AIAA International Space Planes and Hypersonic Systems and Technologies Conference (Aviation 2014), Paper No. AIAA-2014-2805, Atlanta, GA, June 2014.

CP38. A. Brune*, T. West*, **S. Hosder**, and K. Edquist, “Uncertainty Analysis of Mars Entry Flows over Hypersonic Inflatable Aerodynamic Decelerators,” 11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference (Aviation 2014), Paper No. AIAA-2014-2672, Atlanta, GA, June 2014.

CP37. T. West* and **S. Hosder**, “Uncertainty Quantification of Hypersonic Reentry Flows using Sparse Sampling and Stochastic Expansions,” 16th AIAA Non-Deterministic Approaches Conference (SciTech 2014), Paper No. AIAA-2014-0813, National Harbor, MD, Jan. 2014.

CP36. T. West*, **S. Hosder**, and T. Winter, “Quantification of Margins and Uncertainties for Aerospace Systems using Stochastic Expansions,” 52nd AIAA Aerospace Sciences Meeting (SciTech 2014), Paper No. AIAA-2014-0682, National Harbor, MD, Jan. 2014.

CP35. H. Shah*, **S. Hosder**, and T. Winter “A Mixed Uncertainty Quantification Approach with Evidence Theory and Stochastic Expansions,” 16th AIAA Non-Deterministic Approaches Conference (SciTech 2014), Paper No. AIAA-2014-0298, National Harbor, MD, Jan. 2014.

CP34. H. Shah*, **S. Hosder**, and T. Winter “Quantification of Margins and Mixed Uncertainties Using Evidence Theory and Stochastic Expansions,” 16th AIAA Non-Deterministic Approaches Conference (SciTech 2014), Paper No. AIAA-2014-0300, National Harbor, MD, Jan. 2014.

CP33. L. Leifsson, S. Koziel, **S. Hosder**, and D. Riggins, “Physics-based Multi-Fidelity Surrogate Modeling with Entropy-based Availability Methods,” 52nd AIAA Aerospace Sciences Meeting (SciTech 2014), Paper No. AIAA-2014-0473, National Harbor, MD, Jan. 2014.

CP32. L. Leifsson, S. Koziel, Y. Tesfahunegn, **S. Hosder**, and J. Gramanzini*, “Aerodynamic Design Optimization: Physics-based Surrogate Approaches for Airfoil and Wing Design,” 52nd AIAA Aerospace Sciences Meeting (SciTech 2014), Paper No. AIAA-2014-0572, National Harbor, MD, Jan. 2014.

CP31. T. West*, **S. Hosder**, and C. Johnston, “A Multi-Step Uncertainty Quantification Approach Applied to Hypersonic Reentry Flows,” AIAA-Paper 2013-0257, 51st AIAA Aerospace Sciences Meeting, Grapevine, TX, Jan. 2013.

CP30. A. Brune*, **S. Hosder**, S. Gulli, and L. Maddalena, “Numerical Investigation of Variable Transpiration Cooling Effectiveness in Laminar and Turbulent Flows for Hypersonic Cruise Vehicles,” AIAA-Paper 2013-0311, 51st AIAA Aerospace Sciences Meeting, Grapevine, TX, Jan. 2013.

CP29. L. Leifsson, S. Koziel, Y. Zhang*, and **S. Hosder**, “Low-Cost Robust Airfoil Optimization by Variable-Fidelity Models and Stochastic Expansions,” AIAA-Paper 2013-0631, 51st AIAA Aerospace Sciences Meeting, Grapevine, TX, Jan. 2013.

CP28. S. Gulli, L. Maddalena, and **S. Hosder**, “Integrated Analysis for the Design of Reusable TPS Based on Variable Transpiration Cooling for Hypersonic Cruise Vehicles,” 48th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit and 10th International Energy Conversion Engineering Conference, Paper No. AIAA-2012-4161, Atlanta, GA, August 2012 (**Invited Paper**)

CP27. T. West* and **S. Hosder**, “Numerical Investigation of Plasma Actuator Configurations for Flow Separation Control at Multiple Angles of Attack,” 6th AIAA Flow Control Conference, Paper No. AIAA-2012-3053, New Orleans, LA, June 2012.

CP26. L. Leifsson, S. Koziel, and **S. Hosder**, “Comparison Between Aerodynamic and Aeroacoustic Performance of Subsonic Airfoil Shapes,” Paper No. AIAA-2012-3145, 42nd AIAA Fluid Dynamics Conference and Exhibit, New Orleans, LA, June 2012.

CP25. D. Han * and **S. Hosder**, “Inherent and Model-Form Uncertainty Analysis for CFD Simulation of Synthetic Jet Actuators,” 50th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2012-0082, Nashville, TN, Jan. 2012.

CP24. Y. Zang*, **S. Hosder**, L. Leifsson, and S. Koziel, “Robust Airfoil Optimization Under Inherent and Model-Form Uncertainties Using Stochastic Expansions,” 50th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2012-0056, Nashville, TN, Jan. 2012.

CP23. S. Gulli, L. Maddalena, and **S. Hosder**, “Variable Transpiration Cooling: A New Solution for the Thermal Management of Hypersonic Vehicles,” 50th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2012-0221, Nashville, TN, Jan. 2012.

CP22. T. Winter, B. Bettis*, and **S. Hosder**, “Development of an Efficient Uncertainty Quantification Framework Applied to an Integrated Spacecraft System,” AIAA Space 2011 Conference and Exposition, Paper No. AIAA-2011-7155, Long Beach CA, 27-29 September 2011.

CP21. S. Puthran, U. Koyle, S. Hosder, and F. Dogan, “Three-Dimensional CFD Modeling of Tubular Solid Oxide Fuel Cells with Different Fuels,” Proceedings of the ASME 2011 9th Fuel Cell Science, Engineering and Technology Conference FuelCell2011, Paper No. FuelCell2011-54, Washington, DC, August 2011.

CP20. B. Bettis*, **S. Hosder**, and T. Winter, “Efficient Uncertainty Quantification in Multi-Disciplinary Analysis of a Reusable Launch Vehicle,” 17th AIAA International Space Planes and Hypersonic Systems and Technologies Conference, Paper No. AIAA-2011-2393, San Francisco, CA, April 2011.

CP19. S. Gulli, L. Maddalena, and **S. Hosder**, “Investigation of Transpiration Cooling Effectiveness for Air-Breathing Hypersonic Vehicles,” 17th AIAA International Space Planes and Hypersonic Systems and Technologies Conference, Paper No. AIAA-2011-2253, San Francisco, CA, April 2011.

CP18. B. Bettis* and **S. Hosder**, “Uncertainty Quantification in Hypersonic Reentry Flows Due to Epistemic and Aleatory Uncertainties,” 49th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2011-0252, Orlando, FL, Jan. 2011.

CP17. T. Keil*, **S. Hosder**, V. Birman, “Functionally Graded Sandwich Panels with Variable Fiber Volume Fraction in the Facings”, IMECE2010-37278, ASME International Mechanical Engineering Congress and Exposition (IMECE 2010), Vancouver, Canada, November 2010. **(Invited paper)**

CP16. B. Bettis* and **S. Hosder**, “Quantification of Uncertainty in Aerodynamic Heating of a Reentry Vehicle due to Uncertain Wall and Freestream Conditions,” 10th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, Paper No. AIAA-2010-4642, Chicago, IL, June 2010

CP15. S. Adya*, D. Han*, and **S. Hosder**, “Uncertainty Quantification Integrated to the CFD Modeling of Synthetic Jet Actuators,” 5th AIAA/ASME Flow Control Conference, Paper No. AIAA-2010-4411, Chicago, IL, June 2010

CP14. **S. Hosder** and R. W. Walters, “Non-Intrusive Polynomial Chaos Methods for Uncertainty Quantification in Fluid Dynamics”, 48th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2010-0129, Orlando, FL, Jan. 2010. **(Invited Paper)**

CP13. S. Hosder, L. Maddalena, “Efficient Uncertainty Quantification for the Design of a Supersonic Pressure Probe”, 11th AIAA Non-Deterministic Approaches Conference, Paper No. AIAA-2009-2285, Palm Springs, CA, May. 2009.

CP12. S. Hosder, L. Maddalena, “Non-Intrusive Polynomials Chaos for the Stochastic CFD study of a Supersonic Pressure Probe”, 47th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2009-1129, Orlando, FL, Jan. 2009.

CP11. L. Maddalena, **S. Hosder**, A. M. Bonanos, P. E. Dimotakis, “Extended Conical Flow Theory for Design of Pressure Probes in Supersonic Flows with Moderate Flow Angularity and Swirl”, 47th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2009-1072, Orlando, FL, Jan. 2009.

CP10. S. Hosder, R. W. Walters, and M. Balch, “Efficient Uncertainty Quantification Applied to the Aeroelastic Analysis of a Transonic Wing”, 46th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2008-729, Reno, NV, Jan. 2008.

CP9. M. Balch, **S. Hosder**, and R. W. Walters, “Modeling and Propagation of Physical Parameter Uncertainty in a Mars Atmosphere Model”, 46th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2008-450, Reno, NV, Jan. 2008.

CP8. S. Hosder and R. W. Walters, "Non-Intrusive Polynomial Chaos Methods for Stochastic CFD – Theory and Applications," Symposium on “Computational Uncertainty in Military Vehicle Design” NATO Applied Vehicle Technology Panel, RTO-MP-AVT-147, Paper No. 47, Athens, Greece, December 2007.

CP7. S. Hosder, R. W. Walters, and M. Balch, “Efficient Sampling for Non-Intrusive Polynomial Chaos Applications with Multiple Uncertain Input Variables,” 9th AIAA Non-Deterministic Approaches Conference, Paper No. AIAA-2007-1939. Waikiki, Hawaii, April 2007.

CP6. S. Hosder, R. W. Walters, R. Perez, "A Non-Intrusive Polynomial Chaos Method for Uncertainty Propagation in CFD Simulations," 44th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2006-891. Reno, NV, Jan. 2006.

CP5. J. A. Schetz, **S. Hosder**, J. Walker, and V. Dippold, "Numerical Studies of Jet-Wing Distributed Propulsion Fields," 17th International Symposium on Airbreathing Engines, ISABE-2005-1123, Munich, Germany, Sept. 2005.

CP4. S. Hosder, J. A. Schetz, B. Grossman, and W.H. Mason, “Modeling of Airframe Noise Appropriate for MDO”, 42nd AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2004-0698, Reno, NV, Jan. 2004.

CP3. V. Dippold, **S. Hosder** and J. A. Schetz, “Analysis of Distributed Propulsion by Engine Exhaust from Thick Wing Trailing Edges”, 42nd AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2004-1205, Reno, NV, Jan. 2004.

CP2. S. Hosder, B. Grossman, R. T. Haftka, W. H. Mason, and L. T. Watson, “Observations on CFD Simulation Uncertainties,” Proceedings of the 9th AIAA/ISSMO Symposium on Multidisciplinary Analysis and Optimization, Paper No. AIAA-2002–5531, Atlanta, GA, Sept. 2002.

CP1. S. Hosder, R. L. Simpson, "Unsteady Turbulent Skin Friction and Separation Location Measurements on a Maneuvering Undersea Vehicle," 39th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2001-1000, Reno, NV, Jan. 2001.

VI.4 Theses and Dissertations

TD2. S. Hosder, "Clean Wing Airframe Noise Modeling for Multidisciplinary Design and Optimization", PhD thesis, Department of Aerospace and Ocean Engineering, Virginia Tech, July 2004 (available at <http://scholar.lib.vt.edu/theses/available/etd-09072004-093109/>)

TD1. S. Hosder, "Unsteady Skin-Friction Measurements on a Maneuvering DARPA2 SUBOFF Model," M.S. Thesis, Department of Aerospace and Ocean Engineering, Virginia Tech, June 2001 (available at <http://scholar.lib.vt.edu/theses/available/etd-06152001-121441/>).

VII. Scholarly Presentations

VII.1. Invited Talks/Presentations:

IP16. Hosder, S., "Uncertainty Quantification for Hypersonic Flows and Applications", invited seminar (virtual), ANSYS TechTalk Series, May 27, 2021.

IP15. "Effect of Turbulence Model Uncertainty on Scramjet Isolator and Strut Injector Flow Field Analysis", invited seminar (virtual), Mechanical and Aerospace Engineering, The University of Texas at Arlington, April 23, 2021.

IP14. "Computational Research Applied to Hypersonic Flow and Vehicle Modeling", invited seminar (virtual), High Performance Computing Center (HPCC), Missouri S&T, April 20, 2021.

IP13. "Physics Colloquium: Overview of Research Activities in Hypersonic Flows," Physics Department of Truman State University, Kirksville, MO, November 29, 2017.

IP12. "Uncertainty Quantification in Hypersonic Vehicle Analysis and Design," Vehicle Analysis Branch, NASA Langley Research Center, Hampton, VA, September 12, 2017.

IP11. "Sensitivity Analysis and Uncertainty Quantification of Turbulence Model Closure Coefficients and Robust Aerodynamic Shape Optimization," Computational AeroSciences Branch, NASA Langley Research Center, Hampton, VA, September 12, 2017.

IP10. "Modeling and Simulation of Hypersonic Flows and Uncertainty Analysis" Hypersonic Technologies Workshop organized by US Government, Washington DC, (May 2016).

IP9. "Recent Experiences and Projects in Computational Aerothermodynamics Research," Department of Mechanical and Aerospace Engineering, University of Texas at Arlington, Arlington TX, March 30, 2016

IP8. "Efficient Uncertainty Analysis of Mars Entry Flows Over a Hypersonic Inflatable Aerodynamic Decelerator," Aerospace Engineering Seminar Series, Iowa State University, Ames, Iowa, April 16, 2015.

IP7. "Efficient Uncertainty Quantification in Aerospace Simulations with Stochastic Expansions," invited Missouri Institute for Computational and Applied Mathematical Sciences (MICAMS) seminar, Missouri S&T, Rolla, MO, October 24, 2011.

IP6. “Non-Intrusive Polynomial Chaos Methods for Uncertainty Quantification in Fluid Dynamics”, 48th AIAA Aerospace Sciences Meeting and Exhibit, Orlando, FL, Jan. 2010.

IP5. Uncertainty Quantification in Fluid Dynamics with Stochastic Expansions”, Chemical & Biological Engineering Department, Missouri S&T, October 2009.

IP4. “Experiences in Aerodynamic Design with CFD and Uncertainty Quantification”, Embry-Riddle Aeronautical University, Department of Aerospace Engineering, Prescott, Arizona, May 2007.

IP3. “Efficient Uncertainty Quantification in Aerodynamic Analysis and Design”, Missouri University of Science and Technology, Department of Mechanical and Aerospace Engineering, Rolla, Missouri, April 2007.

IP2. “Uncertainty Quantification in Fluid Dynamics via Polynomial Chaos”, Department of Aeronautical Engineering, Istanbul Technical University, Istanbul, Turkey, December 2006.

IP1. “A Non-Intrusive Polynomial Chaos Approach for Stochastic CFD”, Official Department Seminar, Aerospace and Ocean Engineering Department, Virginia Tech, Blacksburg, VA, March 2006.

VII.2. Presentations at Conferences, Workshops, and Professional Meetings:

P20. “Investigation of Turbulence Model Uncertainty for Supersonic/Hypersonic Shock Wave-Boundary Layer Interaction Predictions,” 22nd AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2018-5195, Orlando, FL, Sept. 2018.

P19. “Numerical Analysis of an Actively-Cooled Low-Reynolds Number Hypersonic Diffuser,” 21st AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2017-2363, Xiamen, China, March 2017.

P18. “A Review of Uncertainty Analysis for Hypersonic Inflatable Aerodynamic Decelerator Design,” 21st AIAA International Space Planes and Hypersonic Technologies Conference, Paper No. 2017-2373, Xiamen, China, March 2017.

P17. “Multi-fidelity Robust Aerodynamic Design Optimization Under Mixed Uncertainty,” 17th AIAA Non-Deterministic Approaches Conference (SciTech 2015), Paper No. AIAA-2015-0917, Kissimmee, FL, Jan. 2015.

P16. “Efficient UQ and Sensitivity Analysis for Hypersonic Flow and Material Response Simulations Under Inherent and Model-Form Uncertainties,” 5th NASA/AFRL/SANDIA Ablation Workshop, Lexington, KY, February 28-March 1, 2012.

P15. “Robust Airfoil Optimization Under Inherent and Model-Form Uncertainties Using Stochastic Expansions,” 50th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2012-0056, Nashville, TN, Jan. 2012.

P14. “Inherent and Model-Form Uncertainty Analysis for CFD Simulation of Synthetic Jet Actuators,” 50th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2012-0082, Nashville, TN, Jan. 2012.

P13. “Efficient Uncertainty Quantification for the Design of a Supersonic Pressure Probe”, 11th AIAA Non-Deterministic Approaches Conference, Paper No. AIAA-2009-2285, Palm Springs, CA, May. 2009.

- P12.** “Non-Intrusive Polynomials Chaos for the Stochastic CFD Study of a Supersonic Pressure Probe”, 47th AIAA Aerospace Sciences Meeting & Exhibit, Paper No. AIAA-2009-1129, Orlando, FL, Jan. 2009.
- P11.** “Extended Conical Flow Theory for Design of Pressure Probes in Supersonic Flows with Moderate Flow Angularity and Swirl”, 47th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2009-1072, Orlando, FL, Jan. 2009.
- P10.** “Efficient Uncertainty Quantification Applied to the Aeroelastic Analysis of a Transonic Wing”, 46th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2008-729, Reno, NV, Jan. 2008.
- P9.** "Non-Intrusive Polynomial Chaos Methods for Stochastic CFD – Theory and Applications," Symposium on “Computational Uncertainty in Military Vehicle Design” NATO Applied Vehicle Technology Panel, RTO-MP-AVT-147, Paper No. 47, Athens, Greece, December 2007.
- P8.** “Efficient Sampling for Non-Intrusive Polynomial Chaos Applications with Multiple Uncertain Input Variables,” 9th AIAA Non-Deterministic Approaches Conference, Paper No. AIAA-2007-1939. Waikiki, Hawaii, April 2007.
- P7.** “A Non-Intrusive Polynomial Chaos Method for Uncertainty Propagation in CFD Simulations,” 44th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2006-891. Reno, NV, Jan. 2006.
- P6.** “Modeling of Airframe Noise Appropriate for MDO”, 42nd AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2004-0698, Reno, NV, Jan. 2004.
- P5.** "Blended-Wing-Body Airframe Noise Study", NIA, Hampton, VA, May 2003
- P4.** "Parametric Noise and Distributed Propulsion Studies with GASP", Twelve Month Progress Review Meeting for NASA Langley Research Center Grant NAG 1-02024 "MDO Investigation of Advanced Design Concepts Applied to the Blended Wing-Body Configuration", NIA, Hampton, VA, Jan. 2003
- P3.** “Protection Against Modeling and Simulation Uncertainties in Design Optimization,” NSF/SANDIA Life-Cycle Engineering Program Meeting and Review, Albuquerque, NM, Sept. 2002
- P2.** “Observations on CFD Simulation Uncertainties,” 9th AIAA/ISSMO Symposium on Multidisciplinary Analysis and Optimization, Paper No. AIAA-2002–5531, Atlanta, GA, Sept. 2002.
- P1.** “Unsteady Turbulent Skin Friction and Separation Location Measurements on a Maneuvering Undersea Vehicle,” 39th AIAA Aerospace Sciences Meeting and Exhibit, Paper No. AIAA-2001-1000, Reno, NV, Jan. 2001.

VIII. Research Grants

24. Proposal Title: “Quantification of Margins and Uncertainties in Computational Modeling of Hypersonic Systems”. **Sponsor:** DoD JHTO/UCAH. Total Amount: \$1,499,242.00 **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded (Grant # UCAH PSA M2202904 & JHTO HQ00342190007) **Duration:** November 16, 2022-September 15, 2025.

23. Proposal Title: “Impact of Particle-Laden Flows on Planetary Entry Aerothermodynamics”. **Sponsor:** NASA. Total Amount: \$25,593 (Year 4) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2022-07/31/2023.

- 22. Proposal Title:** “Experimental and Numerical Investigation of Directed Energy Radiation Interactions for Hypersonic Applications”. **Sponsor:** DoD JHTO/UCAH through UT Arlington (Lead Institute). **Total Amount:** \$419,989.00 **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 10/25/2021-10/24/2024.
- 20. Proposal Title:** “Impact of Particle-Laden Flows on Planetary Entry Aerothermodynamics”. **Sponsor:** NASA. **Total Amount:** \$77,580 (Year 3) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2021-07/31/2022.
- 19. Proposal Title:** “Impact of Particle-Laden Flows on Planetary Entry Aerothermodynamics”. **Sponsor:** NASA. **Total Amount:** \$77,498 (Year 2) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2020-07/31/2021.
- 18. Proposal Title:** “Multi-Fidelity Modeling and Simulation for the Analysis of Deployable Re-Entry Technologies under Uncertainty”. **Sponsor:** NASA. **Total Amount:** \$34,762 (Year 4) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2020-07/31/2021.
- 17. Proposal Title:** “MRI: Acquisition of a Supercomputer to Enable Advanced Computational Science and Engineering Research and Education in Missouri. **Sponsor:** NSF. **Total Amount:** \$1,960,000 **Responsibility:** Co-PI. (Share 22%) **Status:** Awarded. **Duration:** 10/01/2019-09/30/2021.
- 16. Proposal Title:** “Impact of Particle-Laden Flows on Planetary Entry Aerothermodynamics”. **Sponsor:** NASA. **Total Amount:** \$76,190 (Year 1) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2019-07/31/2020.
- 15. Proposal Title:** “Multi-Fidelity Modeling and Simulation for the Analysis of Deployable Re-Entry Technologies under Uncertainty”. **Sponsor:** NASA. **Total Amount:** \$76,190 (Year 3) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2019-07/31/2020.
- 14. Proposal Title:** “Uncertainty Reduction in High Speed Flight Vehicle Modeling”. **Sponsor:** Missile Defense Agency (DoD STTR Phase I Program through M4 Engineering, Inc. Role of Missouri S&T: Research Institution). **Total Amount:** \$49,910 (Phase I). **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 03/26/2019-09/25/2019.
- 13. Proposal Title:** “Multi-Fidelity Modeling and Simulation for the Analysis of Deployable Re-Entry Technologies under Uncertainty”. **Sponsor:** NASA. **Total Amount:** \$73,818 (Year 2) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2018-07/31/2019.
- 12. Proposal Title:** “Multi-Fidelity Modeling and Simulation for the Analysis of Deployable Re-Entry Technologies under Uncertainty”. **Sponsor:** NASA. **Total Amount:** \$72,153 (Year 1) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2017-07/31/2018.
- 11. Proposal Title:** “Uncertainty Quantification Applied to the Analysis and Design of Hypersonic Inflatable Atmospheric Decelerators for Spacecraft Re-Entry”. **Sponsor:** NASA. **Total Amount:** \$40,000 (Year 4) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2016-07/31/2017.
- 10. Proposal Title:** “Uncertainty Quantification Applied to the Analysis and Design of Hypersonic Inflatable Atmospheric Decelerators for Spacecraft Re-Entry”. **Sponsor:** NASA. **Total Amount:** \$68,934 (Year 3) **Responsibility:** Sole PI. (Share 100%) **Status:** Awarded. **Duration:** 08/01/2015-07/31/2016.

9. Proposal Title: “Development and Validation of Turbulence Models, Uncertainty Quantification and Optimization Tools for Aircraft and Turbomachinery Analysis and Design”. Sponsor: NASA. Total Amount: \$211,765 (Responsibility: Sole Institutional PI. (Share 100%) Status: Awarded. Duration: 10/01/2014-09/31/2018.
8. Proposal Title: “Uncertainty Quantification Applied to the Analysis and Design of Hypersonic Inflatable Atmospheric Decelerators for Spacecraft Re-Entry”. Sponsor: NASA. Total Amount: \$65,917 (Year 2) Responsibility: Sole PI. (Share 100%) Status: Awarded. Duration: 08/01/2014-07/31/2015.
7. Proposal Title: “Uncertainty Quantification Applied to the Analysis and Design of Hypersonic Inflatable Atmospheric Decelerators for Spacecraft Re-Entry”. Sponsor: NASA. Total Amount: \$64,103 (Year 1) Responsibility: Sole PI. (Share 100%) Status: Awarded. Duration: 08/01/2013-07/31/2014.
6. Proposal Title: “Uncertainty Quantification in Ballistic Missile Defense System Modeling and Simulation”. Sponsor: Missile Defense Agency (DoD MDA STTR Phase I Program through M4 Engineering, Inc. Role of Missouri S&T: Research Institution). Total Amount: \$39,872 (Phase I). Responsibility: Sole PI. (Share 100%) Status: Awarded. Duration: 04/01/2013-09/28/2013.
5. Proposal Title: “Quantification of Uncertainties in Integrated Spacecraft System Models”. Sponsor: NASA Jet Propulsion Lab (NASA 2009 STTR Phase 2 Program through M4 Engineering, Inc. Role of Missouri S&T: Research Institution). Total Amount: \$239,786. Responsibility: Sole PI. (Share 100%) Status: Awarded. Duration: 07/06/2011 to 07/05/2013.
4. Proposal Title: “Quantification of Uncertainties in Integrated Spacecraft System Models”. Sponsor: NASA Jet Propulsion Lab (NASA 2009 STTR Phase 1 Program through M4 Engineering, Inc. Role of Missouri S&T: Research Institution). Total Amount: \$40,166. Responsibility: Sole PI. (Share 100%) Status: Awarded. Duration: 01/29/2010 to 01/28/2011.
3. Proposal Title: “Enhancing Research Infrastructure in the Areas of Aerodynamics and Flow Control at Missouri University of Science and Technology”. Sponsor: NASA Missouri Space Grant Consortium (2010-2011 Affiliates Award Competition). Amount: \$27,485. Responsibility: PI. (Share: 33%, Co-PIs: KM Isaac and J. Rovey). Status: Awarded. Duration: 01/01/2010 to 12/31/2011.
2. Proposal Title: “Advanced Military Installations that Integrate Renewable Energy and Advanced Energy Storage Technologies”. Sponsor: Air Force Research Lab. Responsibility: Co-PI. (Share: 1%, PI: Fatih Dogan). Amount: \$862,500. Status: Awarded. Duration: 07/10/2009 to 07/09/2012.
1. Proposal Title: “Efficient Uncertainty Quantification for Robust Design of Micro Fluid Devices”. Sponsor: University of Missouri Research Board. Responsibility: Sole PI. (Share 100%) Amount: \$28,000. Status: Awarded. Duration: 06/01/2008 to 05/31/2010.

IX. Teaching

Mechanical & Aerospace Engineering Department, Missouri S&T

Between Fall 2007 and Fall 2022, I have taught four different courses, two in 3000 level (AE-3131 Aerodynamics I and AE-3171 Aerodynamics II) and two in 5000 level (AE-5169 Introduction to Hypersonic Flow and AE/ME-5830 Applied Computational Methods). The 3000 level courses are required undergraduate level courses in Aerospace engineering at Missouri S&T. The focus of AE-3131 course is on incompressible, low-speed aerodynamics concepts, whereas the focus of AE-3171 is on high-

speed (transonic and supersonic) aerodynamics. Both AE-5169 and AE/ME-5830 courses are graduate level courses and can also be taken as technical electives by undergraduate students who satisfy the pre-requisites. The focus of AE-5169 course is the study of various methods for the analysis of inviscid and viscous flows in hypersonic regime with applications coming from planetary entry and hypersonic cruise vehicle configurations. I have re-developed/structured AE-3131, AE-3171, and AE-5169 courses, which included the modification of the course content, notes, assignments, and projects. I have developed the AE/ME-5830 Applied Computational Methods as a new course and introduced to the Mechanical and Aerospace Engineering curriculum in the spring semester of 2009. The focus of this course is on the detailed study of the computational methods for efficient solution of selected fluids, structures, thermodynamics, and controls problems in aerospace and mechanical engineering. Besides basic numerical techniques, topics covered include gradient-based optimization and uncertainty quantification. Both AE-5169 and AE/ME-5830 are also offered as online graduate courses for distance education.

Graduate Courses taught:

1. AE-5169 Introduction to Hypersonic Flow (Re-Developed/Structured the course in Fall 2008)

Semester Offered (Total number of students enrolled): Fall 2022 (20), Fall 2021(17), Fall 2020 (25), Fall 2019 (27), Fall 2018 (20), Fall 2017 (35), Fall 2016 (12), Fall 2015 (22), Fall 2014 (16), Fall 2013 (20), Fall 2012 (18), Fall 2011 (27), Fall 2010 (25), Fall 2009 (24), Fall 2008 (23)

2. AE/ME-5830 Applied Computational Methods (New course developed in Spring 2009)

Semester Offered (Total number of students enrolled): Spring 2023 (45), Spring 2022 (45), Spring 2021 (27), Spring 2020 (51), Spring 2019 (30), Spring 2018 (47), Spring 2017 (35), Spring 2016 (29), Spring 2015 (34), Spring 2014 (24), Spring 2013 (53), Spring 2012 (38), Spring 2011 (45), Spring 2010 (33), Spring 2009 (24)

Undergraduate Courses taught:

3. AE-3171 Aerodynamics II (Re-Developed/Structured the course in Spring 2008)

Semester Offered (Total number of students enrolled): Spring 2022 (75), Spring 2021 (50), Spring 2020 (70), Spring 2019 (75), Spring 2018 (73), Spring 2017 (74), Spring 2016 (54), Spring 2015 (58), Spring 2014 (55), Spring 2013 (51), Spring 2012 (48), Spring 2011 (51), Spring 2010 (37), Spring 2009 (35), Spring 2008 (32)

4. AE-3131 Aerodynamics I (Re-Developed/Structured the course in Fall 2007)

Semester Offered (Total number of students enrolled): Fall 2013 (64), Fall 2012 (62), Fall 2011 (33), Fall 2010 (52), Fall 2009 (63), Fall 2008 (56), Fall 2007 (47)

X. Graduate Student Mentorship and Awards

Note: The awards and fellowships received by the graduate students are highlighted in bold below. (AE: Aerospace Engineering)

Current Students (Missouri S&T):

- 1. Adam Boland** (AE PhD Student). Research Area: Quantification of Margins and Uncertainties in Computational Modeling of Hypersonic Systems
- 2. Andrew Heider** (AE PhD student). Research Area: Directed Energy Radiation Interactions for Hypersonic Applications.

3. **Andrew Hinkle** (AE PhD student, **2019 NASA Space Technology Research Fellow**, also Aerospace Engineer at the Aerothermodynamics Branch, NASA Langley Research Center). Research Area: Impact of Particle Laden flows on Planetary Entry Aerothermodynamics.
4. **Rohan Sharma** (PhD student, AE, also Aerospace Engineer at the Boeing Company, Seattle, WA). Research Area: Aircraft design space exploration with machine learning.
5. **Kyle Worden** (AE PhD student, **Missouri S&T Chancellor's Distinguished Fellow**). Research Area: Directed Energy Radiation Interactions for Hypersonic Applications.
6. **Dominic Zanti** (AE PhD Student). Research Area: Quantification of Margins and Uncertainties in Computational Modeling of Hypersonic Systems

Students Graduated (Missouri S&T):

PhD Students:

1. **Mario Santos** (PhD in AE, 2021, **2017 NASA Space Technology Research Fellow**). Dissertation Title: Multi-Fidelity Modeling for Aerothermal Analysis of Deployable Planetary Entry Technologies. (Current Position: Design Configuration Engineer at Boeing Research and Technology, St. Louis, MO)
2. **Aaron Erb** (PhD in AE, 2021, **NASA Langley Pathways Intern**). Dissertation Title: Analysis of Turbulence Model Uncertainty for Canonical Flow Problems Including Shock Wave Boundary Layer Interaction Simulations (Current Position: Aerospace Engineer, Vehicle Analysis Branch, NASA Langley Research Center, Hampton, VA)
3. **Martin Di Stefano** (PhD in AE, 2020, **Missouri S&T Chancellor's Distinguished Fellow**). Dissertation Title: Effect of Turbulence Model Closure Coefficient Uncertainty on Scramjet Flow Field Analysis (Current Position: Senior R&D Aeronautical Engineer, Sandia National Laboratories, Albuquerque, NM)
4. **Aslihan Vuruskan** (PhD in AE, 2020, **Recipient of 2017 Amelia Earhart Fellowship**). Dissertation Title: Impact of Turbulence Models and Shape Parameterization on Robust Aerodynamic Shape Optimization (Current Position: Assistant Professor, Mechanical Engineering, Florida Polytechnic University, Lakeland, FL)
5. **Paul Friz** (PhD in AE, 2019, **NASA Langley Pathways Intern**). Dissertation Title: A Systems and Cost Analysis of Human Rated Mars Entry, Descent, and Landing Vehicles. (Current Position: Aerospace Engineer, Vehicle Analysis Branch, NASA Langley Research Center, Hampton, VA)
6. **Andrew Brune** (PhD in AE, 2016. **2013 NASA Space Technology Research Fellow**). Dissertation Title: Uncertainty Quantification Applied to the Analysis and Design of a Hypersonic Inflatable Aerodynamic Decelerator for Spacecraft Reentry. (Current Position: Aerospace Technologist in Heat Transfer, Structural and Thermal Systems Branch, NASA Langley Research Center, Hampton, VA)
7. **Thomas West** (PhD in AE, 2015. **NASA Langley Pathways Intern**). Dissertation Title: Advancements in Uncertainty Quantification using Stochastic Expansions Applied to Supersonic and Hypersonic Flows. (Current Position: Aerospace Engineer, Vehicle Analysis Branch, NASA Langley Research Center, Hampton, VA)

8. **Harsheel Shah** (PhD in AE, 2015). Dissertation Title: Investigation of Robust Optimization and Evidence Theory Using Stochastic Expansions for Aerospace Simulations Under Mixed Uncertainties. (Current Position: Analytics Project Lead, Caterpillar, Inc., Urbana-Champaign, IL)
9. **Yi Zhang** (PhD in AE, 2013). Dissertation Title: Efficient Uncertainty Quantification for Aerospace Analysis and Design. (Current Position: Modeling Engineer at Corning Inc., Painted Post, NY)

M.Sc. Students:

10. **John Schaefer** (M.Sc. in Aerospace Engineering, Fall 2015). Thesis Title: Uncertainty Quantification of Turbulence Model Closure Coefficients for Transonic Wall-Bounded Flows. (Current Position: Aerospace Engineer at Boeing Research and Technology, St. Louis, MO)
11. **Joe-Ray Gramanzini** (M.Sc. in Aerospace Engineering, Summer 2015). Thesis Title: Adjoint-Based Airfoil Shape Optimization in Transonic Flow. (Current Position: Aerodynamics Engineer at Boeing, St. Louis, MO)
12. **Andrew Brune** (M.Sc. in Aerospace Engineering, Spring 2013). Thesis Title: Numerical Investigation of Variable Transpiration Cooling Effectiveness in Laminar and Turbulent Flows for Hypersonic Cruise Vehicles. (Current Position: Aerospace Technologist in Heat Transfer, Structural and Thermal Systems Branch, NASA Langley Research Center, Hampton, VA)
13. **Thomas West** (M.Sc. in Aerospace Engineering, Spring 2012). Thesis Title: Numerical Investigation of Plasma Actuator Configurations for Flow Separation Control at Multiple Angles of Attack. (Current Position: Aerospace Engineer, Vehicle Analysis Branch, NASA Langley Research Center, Hampton, VA)
14. **Daoru Han** (M.Sc. in Aerospace Engineering, Summer 2011). Thesis Title: Inherent and Model-Form Uncertainty Analysis for CFD simulation of Synthetic Jet Actuators. (Current Position: Assistant Professor of Aerospace Engineering at Missouri S&T)
15. **Srikanth Adya** (M.Sc. in Aerospace Engineering, Fall 2010). Thesis Title: Uncertainty Quantification Integrated to CFD Modeling of Synthetic Jet Actuators. (Current Position: Automotive Applications Consultant at LSTC, Rochester, MI)
16. **Benjamin Bettis** (M.Sc. in Aerospace Engineering, Fall 2010, **Recipient of 2010 NASA Aeronautics Graduate Fellowship**). Thesis Title: Quantification of Uncertainty in Aerodynamic Heating of a Reentry Vehicle due to Uncertain Wall and Freestream Conditions. (Current Position: Lead Aerodynamics Engineer at SpaceX, Los Angeles, CA).

XI. Undergraduate Students Supervised

1. Kyle Maynor (Supported by Missouri S&T, OURE Program, Fall 2022 to date)
2. Dominic Zanti (Supported by Missouri S&T, MAE DURF Program, Summer 2022 to date)
3. Adam Boland (Supported by Missouri S&T, COE DURS Program, Spring 2022 to date)
4. Alex Fangman (Supported by Missouri S&T, OURE Program, Fall 2018-Spring 2019)
5. Andrew Hinkle (Supported by NASA MOSGC Undergraduate Internship, Fall 2016-Spr 2017)
6. Cole Deegan (Supported by NASA MOSGC Undergraduate Internship, Fall 2016-Spr 2017)
7. Adam Lause (Supported by Missouri S&T, OURE Program, Fall 2016-Spring 2017)
8. Mario Santos (Supported by NASA MOSGC Undergraduate Internship, Fall 2015-Spr 2016)

9. Jonathan Hoffman (Supported by Missouri S&T, OURE Program, Summer 2012-Spr 2013)
10. Andrew Brune (Supported by NASA MOSGC Undergraduate Internship, Fall 2010-Spr 2011)
11. Brianna Dowdy (Supported by NASA MOSGC Undergraduate Internship, Fall 2009-Spr 2010)
12. Benjamin Bettis (Supported by NASA MOSGC Undergraduate Internship, Fall 2007-Spr 2009)

XII. Professional Affiliations and Service

American Institute of Aeronautics and Astronautics (AIAA):

1. Associate Fellow, American Institute of Aeronautics and Astronautics (AIAA) (January 2017 to date)
2. AIAA Hypersonic Technologies & Space Planes (HyTASP) Technical Committee (TC)
 - 2.1. Steering Committee Member (May 2021 to date)
 - 2.2. Chair (January 2019 to April 2021)
 - 2.3. Hypersonic Systems & Technologies Award Selection Committee Member (2019 to date)
 - 2.4. Vice Chair and Executive Secretary (January 2017 to January 2019)
 - 2.5. Membership Subcommittee Chair (July 2015 to January 2017)
 - 2.6. Award Nomination Committee Member (July 2015 to January 2019)
 - 2.7. Best Paper Award Selection Committee Member (2015 to date)
3. AIAA Non-Deterministic Approaches Technical Committee (NDA-TC) (2009-2019)
4. AIAA Journal of Spacecraft and Rockets Editor-in-Chief Search Committee Member (November 2016-January 2017)

Reviewer for the following Journals:

1. AIAA Journal
2. Journal of Aircraft
3. Journal of Spacecraft and Rockets
4. Journal of Thermophysics and Heat Transfer
5. Journal of Propulsion and Power
6. Journal of Fluid Mechanics
7. Aerospace Science and Technology
8. Computers and Fluids
9. Shock Waves
10. Flow, Turbulence, and Combustion
11. International Journal of Computational Fluid Dynamics
12. International Journal for Uncertainty Quantification
13. Reliability Engineering & System Safety
14. Structural and Multidisciplinary Optimization
15. Numerical Heat Transfer
16. Journal of Sound and Vibration
17. International Journal of Mathematical Modeling and Numerical Optimization
18. Journal of the Acoustical Society of America
19. Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering
20. ASME Journal of Verification, Validation and Uncertainty Quantification
21. Computer Methods in Applied Mechanics and Engineering

Consulting Activities and Research Proposal/Project Reviews:

1. Consulting for US Government in Hypersonic Technologies (2016 to date)
2. NASA Space Technology Research Fellowship Proposal Review (2022, 2021, 2020, 2018, 2016, 2015 and 2014)
3. Oak Ridge National Laboratory REP Junior Faculty Enhancement Award Proposal Review (2016, 2015 and 2014)
4. Proposal Review for the Research Foundation Flanders-FWO, Belgium (2015)

5. Proposal Review for the Netherlands Organization for Scientific Research (2018, 2016, 2014 & 2013)
6. Proposal Review for Research Grants Council (RGC) of Hong Kong (2018 and 2016)
7. Panel Member for the Merit Review of the DOE National Energy Technology Laboratory funded projects in Computational and Basic Sciences (2013)
8. NASA Postdoctoral Program Proposal Review (2013, 2012, 2011, and 2010)
9. University of Missouri Research Board Award Proposal Review (2014 and 2013)
10. External PhD Thesis Evaluator for Aerospace Engineering Department, IIT Madras, India (2015)
11. External PhD Thesis Evaluator for Mechanical Engineering Department, National Institute of Technology, Warangal, India (2022)

Book Review:

McGraw-Hill (Textbook review on aerodynamics)
Prentice Hall (Textbook review on aerodynamics)
Elsevier (Book review on aerodynamic shape optimization)
Book Chapter Review for Springer Proceedings in Mathematics & Statistics
Book Proposal Review for Imperial Collage Press

Reviewer for the following Conferences:

1. 24th AIAA International Space Planes and Hypersonic Systems and Technologies Conf. (Nov. 2021)
2. 21st AIAA International Space Planes and Hypersonic Systems and Technologies Conf. (March 2017)
3. 20th AIAA International Space Planes and Hypersonic Systems and Technologies Conf. (July 2015)
4. 53rd AIAA Aerospace Sciences Meeting (SciTech 2015, January 2015)
5. 52nd AIAA Aerospace Sciences Meeting (SciTech 2014, January 2014)
6. 12th AIAA Non-Deterministic Approaches Conference (April 2010)
7. 11th AIAA Non-Deterministic Approaches Conference (April 2009)

Session Chair/Co-Chair in Professional Conferences:

1. Chair for “Computational Methods I” session in the 23rd AIAA International Space Planes and Hypersonic Systems and Technologies Conference (November 2021), Las Vegas, NV.
2. Chair for “Computational Methods IV” session in the 22nd AIAA International Space Planes and Hypersonic Systems and Technologies Conference (September 2018), Orlando, FL.
3. Chair for “Hypersonic Fluid Mechanics and Aerodynamics” session in the 22nd AIAA International Space Planes and Hypersonic Systems and Technologies Conference (September 2018), Orlando, FL.
4. Chair for “Hypersonic Fundamentals and History III” session in the 21st AIAA International Space Planes and Hypersonic Systems and Technologies Conference (March 2017), Xiamen, China
5. Chair for “Hypersonic Fundamentals and History IV” session in the 21st AIAA International Space Planes and Hypersonic Systems and Technologies Conference (March 2017), Xiamen, China
6. Chair for “Computational Methods VII” session in the 21st AIAA International Space Planes and Hypersonic Systems and Technologies Conference (March 2017), Xiamen, China
7. Chair for “Computational Methods VIII” session in the 21st AIAA International Space Planes and Hypersonic Systems and Technologies Conference (March 2017), Xiamen, China
8. Chair for “Hypersonic Fundamentals VI” session in the 20th AIAA International Space Planes and Hypersonic Systems and Technologies Conference (July 2015), Glasgow, Scotland
9. Co-Chair for “Hypersonic Fundamentals I” session in the 20th AIAA International Space Planes and Hypersonic Systems and Technologies Conference (July 2015), Glasgow, Scotland
10. Co-chair for “Non-Deterministic Approaches for Design” session in the 16th AIAA Non-Deterministic Approaches Conference (January 2014), National Harbor, MD
11. Co-Chair “Algorithmic Challenges in Uncertainty Analysis” session in the 12th AIAA Non-Deterministic Approaches Conference (April 2010), Orlando, FL
12. Co-Chair “Non-Deterministic Approaches in CFD-1” session in the 11th AIAA Non-Deterministic Approaches Conference (May 2009), Palm Beach, CA

XIII. Service to the Department & University

MAE Department:

- Aerospace Engineering Technical Committee Chair (Fall 2010-Spring 2011, Fall 2016 to date)
- Graduate Committee Member (Fall 2017 to date)
- Promotion and Tenure Committee Member (2021 to date)
- Thermal-Fluids Technical Committee (Chair: Fall 2014-Spring 2016, member: 2014 to date)
- Aerospace Engineering Faculty Search Committee (Chair: Fall 2019-Spring 2020, member: Fall 2011- Spring 2012, Fall 2012-Spring 2012, Fall 2021-Spring 2022)
- Vision of Excellence Development Committee Member (December 2017)
- MAE Department Computer Committee Member (Fall 2011 to date)
- MAE Department Program Assessment Committee (PAC) Member (Fall 2009 to date)

University:

- Graduate Council Member for Aerospace Engineering (2021 to date)
- High Performance Computing Center (HPCC) Member (2017 to date)
- Research Computing Task Force Member (Fall 2009 to date)
- ITCC (Information Technology Computer Committee) Member (Fall 2007-2009)
- Thesis Committee Member for several PhD and MS students
- Freshmen Engineering Advising (approximately 20 students per year) (Fall 2008 to Spring 2017)