

Curriculum Vitae

LAWRENCE DALE THOMAS

June 22, 2021

EDUCATION: UNIVERSITY OF ALABAMA IN HUNTSVILLE, Ph.D., 1988.
Major: Systems Engineering.
First Minor: Computer Engineering
Second Minor: Mathematics
Dissertation: "A Methodology for Commonality Analysis, with Applications to Selected Space Station Systems."

NORTH CAROLINA STATE UNIVERSITY, M.S., 1983.
Major: Industrial Engineering.
Minor: Electronic Engineering
Thesis: "Word Selection for High Recognition Reliability in Automatic Speech Recognition Systems."

UNIVERSITY OF ALABAMA IN HUNTSVILLE, B.S.E., 1981.
Major: Industrial and Systems Engineering

LICENSE: Professional Engineer, Alabama #17107.

CERTIFICATION: INCOSE Expert Systems Engineering Professional (ESEP), #06467.

EXPERIENCE:

UNIVERSITY OF ALABAMA IN HUNTSVILLE, Huntsville, AL

Professor and Eminent Scholar in Systems Engineering (8/15 – present) Perform and guide research in systems engineering theory, with focus on systems complexity, systems integration, technical performance measurement, and systems engineering planning and management. Educate system engineering students in the art and science of systems architecture and design, systems integration, test, and verification, and systems management. Work closely with local and national organizations to assess and assure relevance of University's systems engineering research focus, facilities, and curricula, and participate in and lead local and national forums to determine systems engineering research agenda and advance educational and training methodologies. Also serve as Director of the Alabama Space Grant Consortium, Director of the Alabama NASA Established Program to Stimulate Competitive Research (EPSCoR), and Deputy Director of the UAH Propulsion Research Center.

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EXPERIENCE (continued):

NASA, MARSHALL SPACE FLIGHT CENTER, Huntsville, AL

Associate Center Director (Technical) (3/11 – 7/15) Led technical activities for MSFC, working closely with senior managers across the Center and Agency to assure that MSFC programs and projects were safe, used technically appropriate designs, met technical performance needs, and were timely. Managed the MSFC Internal Research and Development Program. Chaired MSFC and NASA review panels and boards, assessed special program/project teams and personnel (contractor and Government) performance, and provided findings and recommendations to the Center Director and/or appropriate senior managers at the Center and Agency. Major accomplishments included establishment and leadership of the National Institute for Rocket Propulsion Systems and formation and leadership of the NASA Standing Review Board for the James Webb Space Telescope.

NASA, JOHNSON SPACE CENTER, Houston, TX

Program Manager, Constellation Program (5/10 – 3/11) Led development of NASA's next generation of human spaceflight systems. Directed the Ares I and V launch vehicle projects, the Orion spacecraft project, Extra Vehicular Activity project, Mission Operations project, Ground Operations project, and destination systems projects including the Altair lunar lander and lunar surface systems. Worked closely with managers of other human spaceflight programs including Space Shuttle and International Space Station regarding workforce, facility, and industrial base issues of strategic interest to the human spaceflight enterprise. Supported Agency leadership regarding Program engagement in strategic areas including education, legislative affairs, and public outreach. Major accomplishment was successful transition of Constellation Program elements to the three Programs – Orion, Space Launch System, and Ground Systems – that comprise NASA's Exploration Systems.

Deputy Program Manager, Constellation Program (11/07 – 5/10) Assisted the Program Manager in executive leadership of the program. Led Program Integration, providing executive guidance for Program Systems Engineering & Integration, Safety, Reliability, & Quality Assurance, Operations, Test & Integration, Program Planning & Control, and Information Systems. Served as the Constellation Program member on the Agency team planning the transition of Constellation from a developmental to an operational program, including interim collaborative efforts with the Space Shuttle Program. Major accomplishment was successful completion of the Constellation Program Preliminary Design Review.

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EXPERIENCE (continued):

NASA, MARSHALL SPACE FLIGHT CENTER, Huntsville, AL

Associate Program Manager, Constellation Program (8/07 – 11/07) Reported to the Constellation Program Manager and provided the Program leadership at MSFC. Provided strategic input, from the MSFC perspective, to the Constellation Program Manager and his staff; conversely, provided strategic input, from the Constellation Program perspective, to the MSFC Director and his staff. Responsible for the development and implementation of efficient organizational and technical execution at MSFC for assigned Constellation Program Integration activities and functions. Responsible for identification, distribution, control and management of the Constellation Program Integration budget allocated to MSFC for assigned activities.

Chief, Systems Engineering Division (2/06 – 8/07) Managed the systems engineering workforce for all programs and projects supported by the Spacecraft & Vehicles Department at MSFC. Duties included systems engineering for Constellation activities including Ares launch vehicles and other MSFC-assigned Constellation Program tasks. Responsible for performance of functions including (i) requirements management, verification, and validation, (ii) systems management, (iii) systems engineering, (iv) ground operations & integrated logistics, (v) configuration and data management, (vi) risk assessment/management, and (vii) engineering planning. Also served as MSFC skill owner for systems engineering to ensure consistent implementation of tools and engineering best practices, developing and maintaining MSFC systems engineering standards, processes, tools, and engineering environments for systems analysis, systems engineering, and risk assessment for all MSFC programs/projects/tasks. Major accomplishment was establishment of the Systems Engineering Guide, a web-based systems engineering resource for MSFC.

Manager, Systems Engineering & Integration Office (9/04 – 2/06) Led Systems Engineering & Integration all programs and projects managed by the Space Transportation Programs & Projects Office (STPPO) at MSFC. Duties included providing lead systems engineers to all STPPO activities to ensure consistent implementation of tools and engineering best practices, developing and maintaining STPPO-unique standards, processes, tools, and engineering environments for systems analysis, systems engineering, and risk assessment. Major accomplishment included successful acquisition planning for systems engineering support contract for the newly formulated Constellation Program at NASA HQ.

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EXPERIENCE (continued):

Director, Systems Management Office (6/02 – 9/04) Responsible for project management and systems engineering of MSFC programs and projects. Duties included definition of project management, systems engineering, cost analysis, and export control processes for MSFC consistent with Agency guidelines and directives. Duties also included support of advanced program and project planning for MSFC's three product line directorates and performing periodic independent assessments of ongoing program and project run-out costs. Major accomplishments included: (1) analysis of Orbital Space Plane Program workforce planning that led to significant budgetary changes, (2) establishment of new office within the Systems Management Office to provide integrated systems & technology analysis early in the program & project planning cycle to improve planning quality, and (3) establishment of the MSFC Project Management Board to guide the development of the MSFC program & project management, systems engineering, and program control workforce.

Manager, Systems Engineering and Integration Office (3/01 – 6/02) Led overall systems engineering & integration for the NASA Space Launch Initiative. Duties included definition of overall space transportation system architecture including the earth-to-orbit launch vehicle, ground and on-orbit infrastructure, upper stages, mission planning and operations, and maintenance of prototype technology development projects supportive of and consistent with the system architecture. Major accomplishments included (1) development of Systems Engineering Management Plan and (2) development of staffing plan and successful recruitment of personnel to fill identified positions.

Manager, Systems Engineering Office (4/99 – 2/01) Assured sufficiency of system engineering in all MSFC flight projects and programs. Responsible for formulating and leading center and agency initiatives in system engineering practice, evaluation, and tool/process development. Major accomplishments included (1) leadership of a major MSFC trade study on an Alternate Propulsion Module, (2) development of the System Engineering Development Plan, a roadmap of training and work experiences for developing system engineering personnel at MSFC, and (3) development of the MSFC System Engineering Overview, a one-day systems engineering training course.

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EXPERIENCE (continued):

Chief, Systems Test Division (2/98 – 4/99) Managed functional test and checkout of launch vehicles, spacecraft, and payloads developed by the center and its contractors. Testing responsibilities included system qualification and acceptance, electromagnetic interference and compatibility, environmental, electrical component acceptance, and mechanical system leak testing. Division testing activities supported flight projects within all major MSFC programs including Space Transportation, Microgravity, Space Station, and Optics. Major accomplishments consisted of multiple initiatives to enable the division to better support future flight projects.

Technical Assistant to the Director, Systems Analysis and Integration Laboratory (4/96 - 2/98) Served as a Center and Agency expert in system engineering and integration (SE&I). Duties included serving as MSFC member on the NASA System Engineering Forum and participating in the Systems Analysis and Integration Laboratory (SAIL) system engineering process improvement team. Major accomplishments included: (1) development of a project plan and securing of funds for development of quantitative system engineering process metrics focused on system engineering product quality; (2) leading the NASA System Engineering Measurement Workshop, hosted by MSFC in December 1998; and (3) implementation of process capture, integration, and improvement methodology for SE&I within SAIL.

NASA, JOHNSON SPACE CENTER, Houston, TX

Manager, Space Station Vehicle Analysis and Integration Team (12/93 - 4/96) Led overall Flight Vehicle systems engineering and integration (SE&I) for the International Space Station and managed development of multi-use and Government Furnished Equipment (GFE) subsystem components. SE&I duties included leadership of Flight Vehicle configuration and subsystem architectures, design integration, test and verification. Component development duties included cost, schedule, and technical management. Major accomplishments included initial organizational development, planning and successful completion of four program design reviews, development and application of a cohesive engineering specification scheme, development and implementation of a GFE management scheme, and definition of program SE&I task content for Prime contract negotiation.

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EXPERIENCE (continued):

NASA, MARSHALL SPACE FLIGHT CENTER, Huntsville, AL

Project Engineer (7/88-12/93) Technically managed selected disciplines in the Space Station detailed design and development activity. Duties include definition of required analyses and interface with European, Japanese, and Canadian space agencies regarding NASA Space Station efforts in these areas. Major accomplishments included negotiation of NASA/ESA/NASDA agreement on International Standard Payload Rack interfaces and securing program funding for development of an expert system for payload rack integration.

Aerospace Systems Engineer (6/83-7/88) Lead Engineer in the Space Station preliminary design activity with responsibility for the common equipment rack and overall commonality analysis of the MSFC elements of the Space Station. Major accomplishment was leading a \$1M contracted effort in the successful development of a commonality analytical model.

INTERNATIONAL BUSINESS MACHINES CORP., Raleigh, NC

Student Associate Engineer (5/82-6/83 and 6/81-9/81) Primarily responsible for the user specification of a Human Factors Test Laboratory. Work included a needs assessment, floorplan layout, equipment and construction justification, and computer/data acquisition system specification.

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EXPERIENCE (continued):

UNIVERSITY OF ALABAMA IN HUNTSVILLE, Huntsville, AL

Industrial and Systems Engineering and Engineering Management Department: (6/84
– present)

Adjunct Associate Professor -- (September 1991 appointment).

Associate Member of the Graduate Faculty -- (August 1990 appointment).

Lecturer -- (June 1984 appointment)

Classroom instruction includes:

- ISE 326 – Production & Operation Systems I (undergraduate)
- ISE 327 – Management Systems Analysis (undergraduate)
- ISE 328 – Introduction to Systems Engineering (undergraduate)
- ISE 390 – Probability & Engineering Statistics I (undergraduate)
- ISE 391/490 – Probability & Engineering Statistics II (undergraduate)
- ISE 480/580 – Systems Engineering Modeling (undergraduate/graduate)
- ISE 626 – Introduction to Operations Research (graduate)
- ISE 627 – Introduction to Systems Engineering (graduate)
- ISE 636/726 – Systems Modeling (graduate)
- ISE 637 – Systems Modeling & Analysis (graduate)
- ISE 639 – Integrated Model Development (graduate)
- ISE 690 – Statistical Methods for Engineers (graduate)
- ISE 790 – Advanced Statistical Methods for Engineers (graduate)

PROFESSIONAL AFFILIATIONS:

- Associate Fellow – American Institute of Aeronautics and Astronautics
- Senior Member – International Council on Systems Engineering
- Member – Institute of Electrical and Electronics Engineers

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HONORS AND AWARDS:

- Joint Army Navy NASA Air Force (JANNAF) Interagency Propulsion Committee Sustained Contribution Award (June 2015)
- Presidential Rank of Meritorious Executive (October 2014)
- NASA Medal for Outstanding Leadership (August 2012, June 2000)
- NASA Exceptional Service Medal (June 2007)
- NASA Exceptional Achievement Medal (June 2002)
- UAH Distinguished Engineering Alumni Academy (May 2002)
- Who's Who in America (2002)
- Who's Who in Science and Engineering (2000, 2001)
- NASA Silver Snoopy Award (February 1999)
- NASA Space Station Chester A. Vaughan Engineering Excellence Award (1996)
- UAH/IIE Graduate Research Award (First Place) for Doctoral Dissertation
- IIE Graduate Research Award (Third Place Nationally) for Master's Thesis
- Society of Manufacturing Engineers' Fellowship (1982)
- N.C. State Dean's Fellowship (1981)
- UAH Engineering Student of the Year (1980)
- Wernher von Braun Scholarship (1980)
- Who's Who Among American Colleges and Universities (1980)
- Phi Kappa Phi (Academic Honor Society, inducted 1980)
- Tau Beta Pi (Engineering Honor Society, inducted 1980)
- UAH Merit Scholarship (1978)

PROFESSIONAL ACTIVITIES:

- Reviewer, *Systems Engineering* journal (periodic)
- Reviewer, *Journal of Computing and Information Science in Engineering* (periodic)
- Reviewer, INCOSE International Symposium 2019, 2020, 2021
- Member Independent Review Team, NASA MMPACT (Moon to Mars Planetary Autonomous Construction Technology) Project (ongoing)
- Commencement Speaker, UAH Fall Commencement for Colleges of Engineering and Nursing (12/19)
- Keynote speaker, UAH Tau Beta Pi initiation dinner (4/19)
- Session chair and judge for AIAA NextGen Symposium (10/17, 10/18)
- Panel moderator for UAH Space Day (10/18)
- Reviewer, 2019 Conference on Systems Engineering Research
- UAH Commercial Space Industry Roundtable Member (ongoing)
- Panel Moderator, AIAA Young Professionals Symposium (10/17)

PROFESSIONAL ACTIVITIES (continued):

- Panel Moderator, Wernher von Braun Symposium (10/17)
- Panel Moderator & Session Chair, 2017 American Society for Engineering Management International Annual Conference (10/17)
- Keynote, National Science Foundation Workshop on Advanced Manufacturing Research in Aerospace (7/17)
- Panelist, AIAA Aviation Forum (6/17)
- Panel Moderator, NASA Human Spaceflight Knowledge Sharing Forum (11/16)
- Panel Moderator, AIAA Young Professionals Symposium (10/16)
- Panel Moderator, Wernher von Braun Symposium (10/16)
- Program Chair, 2016 Conference on Systems Engineering Research (3/16)
- Member, Vice Chair & Chair, State of Alabama Robotics Technology Park Board ('12-'16)
- Government Chair – 2012 AIAA/ASME/SAE/ASEE Joint Propulsion Conference
- Chair – International Astronautical Federation Space Systems Committee ('05-'08)
- Session Chair – 53rd World Space Congress (10/02)
- Session Chair – 52nd, 54th, 55th, 56th, 57th, 58th, & 59th International Astronautical Congress (10/01, 10/03, 10/04, 10/05, 10/06, 10/07, & 10/08)
- Dinner Speaker – Annual Dinner Banquet of the Huntsville Chapter of the International Council on Systems Engineering (7/97, 9/05, 6/06)
- Session Chair – Fifth International Conference on Engineering, Construction, and Operations in Space (6/96)
- Robotics Panel member – Society of Logistics Engineers Annual Conf. (8/91)
- Technical Program Committee Member and Session Chair – Fifth Conference on Artificial Intelligence for Space Applications (5/90)

PUBLICATIONS:

Books and Book Chapters:

1. W. Larson, D. Kirkpatrick, J. Sellers, D. Thomas, & D. Verma (ed.), *Applied Space Systems Engineering*, McGraw-Hill, 2009.
2. D. Thomas, "Technical Planning," Chapter 13 in *Applied Space Systems Engineering*, edited by W. Larson et.al., McGraw-Hill, 2009.
3. V. Weyers and D. Thomas, "Alternate Architectural Concepts," Chapter 2 in *Space Launch and Transportation Systems*, Defense Information Technology Service, 2005.
4. E. Messerschmid, R. Bertrand, and D. Thomas, "Design and Sizing Space Elements," Chapter 11 in *Human Space Mission: Analysis and Design*, edited by W. Larson, McGraw-Hill, 1999.

PUBLICATIONS (continued):

Journal articles in preparation:

- D. Thomas & G. Jennings &, "A SysML Based X-in-the-Loop System Modeling Strategy," *IEEE Systems Journal*. (in preparation)
- D. Thomas & A. Bower, "The Effects of Structural Margin in the Test-Fail-Fix Cycle for Rocket Engines," *AIAA Journal of Spacecraft and Rockets*. (in preparation)
- S. Kumar, D. Thomas, & J. Cassibry, "Nuclear Propulsion for Future Planetary Missions," *Nuclear Technology*. (in preparation)
- S. Rawlins, Y. Kim, & D. Thomas, "Low Thrust Class Nuclear Thermal Propulsion using Low Enriched Uranium," *Annals of Nuclear Energy*. (in preparation)

Journal articles submitted & under review:

- V. Lopez & D. Thomas, "Proposed metric for complexity assessment using SysML," *Journal of Engineering Design*. (submitted)

Journal articles published or accepted for publication:

1. N. Morris, D. Thomas & K. Hollingsworth, "Stay Cool—Alternatives for Long-Term Storage of Large Quantities of Liquid Hydrogen on a Mars Transfer Vehicle," *Nuclear Technology*, 2020; 207(6), pp. 860-865. DOI: 10.1080/00295450.2020.1819157.
2. J. Grumbach & D. Thomas, "Integration Principles for Complex Systems," *Systems Engineering*. November 2020, pp. 684-706. DOI: 10.1002/sys.21554.
3. D. Nikitaev & D. Thomas, "Seeded Hydrogen in Mars Transfer Vehicles Using Nuclear Thermal Propulsion," *AIAA Journal of Spacecraft and Rockets*. 2020. DOI: 10.2514/1.A34722.
4. J. Kolligs & D. Thomas, "The Origins and Evolution of Requirements in Engineering," *IEEE Systems Journal*. 2020. DOI: 10.1109/JSYST.2020.2999557.
5. D. Nikitaev & D. Thomas, "Seeded Hydrogen in Nuclear Thermal Propulsion Engines," *AIAA Journal of Spacecraft and Rockets*, 2020. DOI: 10.2514/1.A34711.
6. D. Thomas & E. Patterson, "Systems Modeling Language Viewpoint Utilization to Facilitate Shared Mental Models among System Stakeholders," *Systems Research and Behavioral Science*, 2020;37 (1),128–140. DOI: 10.1002/sres.2610.
7. Aueron, D. Thomas, & J. Cassibry, "Analytical Modeling of Radiation Attenuation and Heat Deposition in Propellant for Nuclear Thermal Rockets," *AIAA Journal of Spacecraft and Rockets*, March 2019. DOI 10.2514/6.2018-2179.
8. V. Lopez & D. Thomas. "Complexity assessment using SysML models." *Procedia Computer Science* 153 (2019): 225-232. DOI: 10.1016/j.procs.2019.05.074.
9. D. Thomas, J. Hanley, J. Rhatigan, & D. Neubek, "NASA's *Constellation* Program: The Final Word," *Systems Engineering*, 16(1), pp. 71-86, January 2013.

PUBLICATIONS (continued):

10. B. Muirhead & D. Thomas, "The Art & Science of Systems Engineering of Tightly Coupled Programs," *SAE Journal of Passenger Cars – Electronic and Electrical Systems*, 3(2), pp. 117-130, December 2010.
11. D. Thomas, "Selected Systems Engineering Process Deficiencies & Their Consequences," *Acta Astronautica*, 61, pp. 406-15, June/August 2007.
12. T. Lee and D. Thomas, "Cost Growth Models for NASA's Programs," *Journal of Probability and Statistical Science*, Vol. 1, No. 2, pp. 265–279, Aug. 2003.
13. T. Lee and D. Thomas, "Cost growth models for NASA's programs: A summary." *Computing Science and Statistics* 33, pp. 431-440, 2001.
14. D. Thomas, "Functional Implications of Component Commonality in Operational Systems," *IEEE Transactions on Systems, Man, and Cybernetics*, 22(3), pp. 548-551, May/June 1992.
15. D. Thomas, "Commonality Analysis using Clustering Methods," *Operations Research*, 39(4), pp. 677-680, July/August 1991.

Conference papers:

1. N. Morris & D. Thomas, "ZBO Storage of Liquid Hydrogen Applied to the Mars Transfer Vehicle," 72nd International Astronautical Congress, Dubai, October 25-29, 2021. (submitted)
2. J. Keese & D. Thomas, "Application of Liquid Propulsion System Testing Approaches to Nuclear Thermal Propulsion System Development," 72nd International Astronautical Congress, Dubai, October 25-29, 2021. (submitted)
3. E. Wood & D. Thomas, "Power Generation Alternatives for a Nuclear Thermal Propulsion Engine," 72nd International Astronautical Congress, Dubai, October 25-29, 2021. (submitted)
4. S. Godshall & D. Thomas, "Innovative, Convergent Education System Alternatives for United States Space Force Engineers and Computer Scientists," IEEE Frontiers in Education 2021, Lincoln, Nebraska, October 13-16, 2021. (accepted)
5. D. Nikitaev & D. Thomas, "In-Situ Alternative Propellants for Nuclear Thermal Propulsion," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
6. D. Nikitaeva, D. Nikitaev, & D. Thomas, "Details of the Spacecraft Integrated System Model For Nuclear Thermal Propulsion Applications," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
7. D. Thomas, M. Houts, K. Hollingsworth, R. Frederick, & J. Cassibry, "Establishing the Feasibility of the Centrifugal Nuclear Thermal Rocket," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)

PUBLICATIONS (continued):

8. E. Wood & D. Thomas, "Nuclear Thermal Propulsion Engine Minimally-Intrusive Power Generation Alternatives," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
9. S. Raghu & D. Thomas, "Liquid Propulsion: Modeling and Simulation of Liquid Propulsion Systems, Components, and Processes," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
10. S. Kumar, D. Thomas, & J. Cassibry, "Model-Based Approach for Conceptual Mission Design for NTP Enabled Robotic Missions," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
11. J. Keese & D. Thomas, "Historical Approaches of Testing Liquid and Nuclear Thermal Rockets Applied to Current Nuclear Thermal Propulsion Development," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
12. A. Aueron & D. Thomas, "Perspectives on NTP: Mapping Values to Systems," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
13. M. Tudor, D. Thomas, & G. Wang, "Analysis and Utility of a Structural Margin Based Design for Failure Prone Components in Liquid Rocket Engines," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
14. N. Morris, D. Thomas, & K. Hollingsworth, "Passive ZBO Storage of Liquid Hydrogen Applied to the Mars Transfer Vehicle," AIAA Propulsion and Energy Forum and Exposition, Denver, August 9-11, 2021. (submitted)
15. J. Keese & D. Thomas, "Liquid Propulsion System Testing Best Practices Approaches Applied to Nuclear Thermal Propulsion System Development," 68th Joint Army Navy NASA Air Force (JANNAF) Joint Subcommittee Meeting, virtual, June 7-17, 2021. (submitted)
16. D. Nikitaev and D. Thomas, "Alternative Propellants for Nuclear Thermal Propulsion," 68th Joint Army Navy NASA Air Force (JANNAF) Joint Subcommittee Meeting, virtual, June 7-17, 2021. (submitted)
17. S. Kumar, D. Thomas, & J. Cassibry, "Decoding the Mission Design Problem for NTP Systems for Outer Planet Robotic Missions," Nuclear and Emerging Technologies for Space (NETS) 2021, virtual, April 26-30, 2021. (submitted)
18. N. Morris, D. Thomas, & K. Hollingsworth, "A Cool Model to Analyze Heat Deposition on MTV Propellant Tanks," Nuclear and Emerging Technologies for Space (NETS) 2021, virtual, April 26-30, 2021. (submitted)

PUBLICATIONS (continued):

19. E. Wood & D. Thomas, "Alternatives for Electrical Power Production from a Nuclear Thermal Propulsion Engine," Nuclear and Emerging Technologies for Space (NETS) 2021. virtual, April 26-30, 2021. (submitted)
20. S. Kumar, D. Thomas, J. Cassibry, "Nuclear Thermal Propulsion for Outer Planets Robotic Exploration," 52nd Lunar and Planetary Science Conference, virtual, March 15-19, 2021. (accepted)
21. Rountree & D. Thomas, "MBSE to Incorporate Human Systems Integration Modelling," AIAA SciTech, Nashville, Tennessee, January 11-15, 2021.
22. S. Godshall & D. Thomas, "U.S. Space Force Collaborative Education System: Needs Analysis and Concept Exploration," AIAA SciTech, Nashville, Tennessee, January 11-15, 2021.
23. V. Lopez, A. Flint, & D. Thomas, "Programmatic Management for the AEGIS CubeSat in a Model Based System Engineering Environment," AIAA SciTech, Nashville, Tennessee, January 11-15, 2021.
24. S. Raghu & D. Thomas, "Model Based Failure Mode, Effects and Criticality Analysis (MBFMECA) for the RS-25 Engine using SysML," AIAA SciTech, Nashville, Tennessee, January 11-15, 2021.
25. D. Nikitaev & D. Thomas, "Transient Performance of a Nuclear Thermal Propulsion Engine Utilizing Seeded Hydrogen," AIAA SciTech, Nashville, Tennessee, January 11-15, 2021.
26. Aueron & D. Thomas, "Evaluating Tension between Specialization and Generalization in System Design with Excess Functionality," AIAA SciTech, Nashville, Tennessee, January 11-15, 2021.
27. D. Nikitaeva, D. Thomas, A. Aueron, S. Kumar, & D. Nikitaev, "Nuclear Thermal Propulsion Spacecraft Integrated System Model," AIAA SciTech, Nashville, Tennessee, January 11-15, 2021.
28. D. Nikitaev, S. Kumar, D. Thomas, & J. Cassibry, "Launch Vehicle Selection for Mars Transfer Vehicles Utilizing Seeded Hydrogen in a Nuclear Thermal Propulsion System," AIAA ASCEND, Las Vegas, Nevada, November 16-18, 2020.
29. Aueron and D. Thomas, "Value Driven Mars Architecture Design," AIAA Propulsion and Energy Forum and Exposition, New Orleans, August 24-26, 2020.
30. S. Kumar, D. Thomas, and J. Cassibry, "Preliminary Trajectory Design for Jupiter Rendezvous Mission Using Nuclear Thermal Propulsion," AIAA Propulsion and Energy Forum and Exposition, New Orleans, August 24-26, 2020.
31. S. Kumar, D. Thomas, J. Cassibry, and R. Frederick, "Review of Nuclear Thermal Propulsion Technology for Deep Space Missions," AIAA Propulsion and Energy Forum and Exposition, New Orleans, August 24-26, 2020.

PUBLICATIONS (continued):

32. N. Morris and D. Thomas, "A Cool Model to Analyze Heat Deposition on MTV Propellant Tanks," AIAA Propulsion and Energy Forum and Exposition, New Orleans, August 24-26, 2020.
33. E. Wood, D. Thomas, and J. Cassibry, "Minimally-Intrusive Power Generation Alternatives from a Nuclear Thermal Propulsion Engine," AIAA Propulsion and Energy Forum and Exposition, New Orleans, August 24-26, 2020.
34. Aueron & D. Thomas, "Mars Mission Architecture Decision through Value Models," Nuclear and Emerging Technologies for Space, American Nuclear Society Topical Meeting, Knoxville, Tennessee, April 6-9, 2020.
35. E. Wood & D. Thomas, "Alternatives for Electrical Power Production from a Nuclear Thermal Propulsion Engine", Nuclear and Emerging Technologies for Space, American Nuclear Society Topical Meeting, Knoxville, Tennessee, April 6-9, 2020.
36. D. Nikitaev, D. Thomas, & J. Cassibry, "A Laboratory Test to Evaluate Seeded Hydrogen in a Nuclear Thermal Rocket Engine, Nuclear and Emerging Technologies for Space, American Nuclear Society Topical Meeting, Knoxville, Tennessee, April 6-9, 2020.
37. Rountree, V. Lopez, & D. Thomas, "Change Management Processes in MBSE," 18th Conference on Systems Engineering Research, Redondo Beach, California, March 19-21, 2020.
38. Aueron, D. Thomas, & P. Collopy, "The Value of Enhanced Delta V Capacity: A Europa Clipper Case Study," 70th International Astronautical Congress, Paper IAC-19,D2,8-A5.4,12,x51117, Washington, DC, October 21-25, 2019.
39. Aueron & D. Thomas, "Nuclear Thermal Propulsion Vehicle Scaling and the Importance of Densified Propellant," AIAA Propulsion & Energy Forum, Indianapolis, Indiana, Paper AIAA-2019-3942, August 19-22, 2019.
40. D. Thomas, A. Aueron, V. Lopez, & A. Bower, "Virtual Systems Integration Applied to Advanced Space Systems," AIAA Propulsion & Energy Forum, Indianapolis, Indiana, August 19-22, 2019.
41. Aueron & D. Thomas, "Trades on Densified Propellant for Nuclear Thermal Propulsion," Nuclear and Emerging Technologies for Space, American Nuclear Society Topical Meeting, Richland, Washington, February 25 – 28, 2019.
42. S. Rawlins & D. Thomas, "A Proposed Solution to Address Nuclear Thermal Propulsion Fuel Embrittlement and Cryogenic Hydrogen Requirements," Nuclear and Emerging Technologies for Space, American Nuclear Society Topical Meeting, Richland, Washington, February 25 – 28, 2019.
43. J. Cassibry, D. Thomas, R. Wood, R. Frederick, and S. Kumar, "Development Plan for a Fission and Fusion Powered Propulsion System to Reach Mars in 45 Days," AAS Guidance Navigation and Control Conference, Breckenridge, Colorado, February 1-6, 2019.

PUBLICATIONS (continued):

44. H. Davidz, S. Jackson, & D. Thomas, "Systems Engineering Pathology: Comprehensive Characterization of Systems Engineering Dysfunction," INCOSE International Symposium, Washington, DC, July 7-12, 2018.
45. M. Gethers & D. Thomas, "Utilization of Goal Function Trees for Robust Requirements Definition," INCOSE International Symposium, Washington, DC, July 7-12, 2018.
46. Aueron, D. Thomas, & J. Cassibry, "Analytical Radiation Attenuation and Heat Deposition Modeling for Conceptual Design of Nuclear Thermal Rockets," AIAA Propulsion & Energy Forum, Cincinnati, Ohio, July 9-11, 2018.
47. Bower & D. Thomas, "Creating an Affordability Model for the RS-25 Liquid Rocket Engine," AIAA Propulsion & Energy Forum, Cincinnati, Ohio, July 9-11, 2018.
48. R.A. Frederick, P. Ligrani, & D. Thomas, "Propulsion Research and Academic Programs at the University of Alabama in Huntsville - PRC Laboratory Capabilities - 2018," AIAA Propulsion & Energy Forum, Cincinnati, Ohio, July 9-11, 2018.
49. Aueron, Z. Thomas, & D. Thomas, "Mars Transport Optimization," Joint Army Navy NASA Air Force (JANNAF) Joint Subcommittee Meeting, Long Beach, California, May 21-24, 2018.
50. Bower & D. Thomas, "Liquid Rocket Engine Production Process Modelling," Joint Army Navy NASA Air Force (JANNAF) Joint Subcommittee Meeting, Long Beach, California, May 21-24, 2018.
51. M. Gethers & D. Thomas, "A Method for Robust Requirements Definition," 16th Conference on Systems Engineering Research (CSER), Charlottesville, Virginia, May 8-9, 2018.
52. V. Lopez & D. Thomas, "Complexity metrics suite for systems modelled using SysML," 16th Conference on Systems Engineering Research (CSER), Charlottesville, Virginia, May 8-9, 2018.
53. J. Gariepy & D. Thomas, "Diagnosing Failures in Complex Engineered Systems," 16th Conference on Systems Engineering Research (CSER), Charlottesville, Virginia, May 8-9, 2018.
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