James C. Sutherland

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Education

May, 2004	Doctor of Philosophy in Chemical Engineering, The University of Utah GPA: 3.96 Dissertation: "Evaluation of Large-Eddy Simulation Mixing and Reaction Models for Nonpremixed Combustion using Direct Numerical Simulation"
June, 1999	Bachelor of Science in Chemical Engineering, The University of Utah GPA: 3.88, Cum Laude Thesis: "A Study of the Chemistry of NO Formation and Reduction Using Methane, Carbon Monoxide, and Hydrogen as Reburning Fuels"

Academic Appointments & Affiliations

January 2020 - Present	Associate Chair - Department of Chemical Engineering, The University of Utah
July 2019 - Present	Professor of Chemical Engineering, The University of Utah
February, 2020 - Present	Adjunct Professor - School of Computing, The University of Utah
July, 2013 - February, 2020	Adjunct Associate Professor - School of Computing, The University of Utah
July, 2012 - June, 2019	Associate Professor of Chemical Engineering, The University of Utah
October, 2006 - June, 2012	Assistant Professor of Chemical Engineering, The University of Utah
May, 2011 - June, 2013	Adjunct Assistant Professor, School of Computing, The University of Utah
2020 - Present	Affiliated Member - Utah Center for Data Science
2010 - Present	Primary investigator, Center for Parallel Computing, The University of Utah
2006 - 2018	Primary investigator, Institute for Clean & Secure Energy, The University of Utah
August, 2004 – October, 2006	Post-doctoral research assistant – Thermal/Fluids Computational Engineering Sciences, Sandia National Laboratories (Albuquerque, NM).
August 1999 - July 2004	Ph.D. Student & Student Intern – Combustion Research Facility, Sandia National Laboratories (Livermore, CA) & The University of Utah.
1998-1999	Research Assistant - University of Utah Advanced Combustion Group.

Professional Service

National & International Service

Associate Editor (2020-2026)	Proceedings of the Combustion Institute
Organizing Committee Member (2022-2024)	APS Division of Fluid Dynamics meeing in Salt Lake City, 2024.
Colloquium Co-Chair (2019-2020)	38th International Symposium on Combustion
Board Member (2015-2021)	Western States Section of the Combustion Institute
Minisymposium Organizer (2019)	17th International Conference on Numerical Combustion. "Algorithms, Applications and Software for Combustion Modelling on GPU and Hybrid Architectures"
Minisymposium Organizer (2017)	14th US National Congress on Computational Mechanics. "Complex Multi-Physics Coupling Techniques: Advances and Applications"
Chair (2010-2013)	Organizing committee, 8^{th} U.S. National Combustion Meeting, 2013. (approximately 420 attendees)
Minisymposium Organizer (2011)	International Conference on Numerical Combustion, 2011. "Validation and Uncertainty Quantification in Highly Complex Systems"
Minisymposium Organizer (2010)	SIAM Parallel Processing Conference, 2010. "Software Design Patterns for Addressing Complexity in Large Scale Multiphysics Applications." Co-organizer with Roger Pawlowski and Pat Notz (Sandia National Laboratories)
Reviewer-Journals	Proceedings of the Combustion Institute, Combustion & Flame, Combustion Theory & Modeling, Flow, Turbulence & Combustion, Combustion Science & Technology, Theoretical and Computational Fluid Dynamics, Journal of Computational Physics, AIAA Journal, Combustion Science & Technology, Computers & Math with Applications, Chemical Engineering Science, Theoretical and Computational Fluid Dynamics, Fuel, Journal of Thermal Science and Engineering Applications, International Journal of Computational Fluid Dynamics, Zeitschrift für Physikalische Chemie, Fuel Processing Technology, Applied Thermal Engineering, MethodsX, ACM Transactions on Mathematical Software, Computer Physics Communications
Reviewer-Agencies	U.S. Department of Energy - Basic Energy Sciences, National Science Foundation CBET Division, ACS Petroleum research fund, U.S. Civilian Research & Development Foundation Cooperative Grants Program, Indo-US Science & Technology Forum

University Service

Chair (2024-2026)	Academic Sendate Consolidated Hearing Committee
Member (2020-2026)	Academic Senate Consolidated Hearing Committee
Member (2021-2024)	College of Engineering Seed Grant Review Committee
Chair (2020-2024)	College of Engineering Academic Appeals & Misconduct Committee
Member (2008-present)	Center for High Performance Computing User's Council
Member (2018-2020)	Academic Senate Executive Committee
Member (2017-2020)	Academic Senate
Member (2017-2020)	College Council
Member (2016-2019)	Student Behavior Committee
Member (2013-2019)	Academic Appeals & Misconduct Committee
Editor (2010-2012)	Institute for Clean & Secure Energy Technical Reports
Member (2009-2013)	College of Engineering College Council Committee
Member (2008-2013)	Center for High Performance Computing Allocations Committee

Departmental Service

Associate Chair (January 2020 - Present)	Department of Chemical Engineering
Chair (2023-present)	Faculty search committee (rolling search)
Chair (2020-present)	Department RPT committee
co-Chair (2021-present)	Faculty awards committee
Chair (2007-2019)	Ph.D. qualifying examination sub-committee
Chair (2015-2016)	Faculty search committee
Member (2012-2014)	Meldrum endowed professorship search committee
Member (2007-2023)	Chemical Engineering Graduate Committee

Other Service/Outreach Activities

2022	STEMCAP presenter - 4 presentations to incarcerated youth on STEM topics.
2020-2021	COVID risk mitigation advisor to the Tabernacle Choir at Temple Square.

Academic Awards & Honors

2023	Distinguished paper award in the 39th International Symposium on Combustion
2022	Top 15% teaching in college of Engineering (Spring semester)
2021	Honorary member of the Western States of the Combustion Institute Board of Directors
2017	College of Engineering Outstanding Teacher award
2016-2017	Department of Chemical Engineering Outstanding Faculty award.
2016	Best lecturer award from Chemical Engineering class of 2016.
2014	Top 10% teaching in College of Engineering (Spring semester)
1999-2004	Sandia Graduate Fellowship Recipient
2003	Outstanding Teaching Assistant Award - University of Utah College of Engineering
2001	John Zink Scholar
2001	Oblad Award (presented by the ChEn faculty to an outstanding senior each year)
1999	All-American Award in Pistol Shooting
1995-1999	Honors at Entrance Full Tuition Scholarship - University of Utah

Teaching Responsibilities

ChEn 1703	Intro. to Engineering Computing	2001, 2007, 2008
ChEn 2450	Numerical Methods in Chem. Eng.	Annually 2008-2016
ChEn 3603	Mass Transfer & Separations	Annually 2013-2023
ChEn 6603	Multicomponent Mass Transfer	2007, 2009-2012, 2023
ChEn 6703	Advanced Numerical Methods in Chemical Engineering	2017-2018, 2020-2023

Contributions to Innovative Teaching

- I screencast each of my lectures so students can review material after class.
- Developed a wiki page with online tutorials for students.
- Participated in the "Integration of Simulation Technology into the Engineering Curriculum" workshop at Cornell University (Summer, 2008)
- Participated in development of an online thermodynamics course, (2001).

M.S. & Ph.D. Students Supervised

Name	Degree	Year
Dallin Littlewood	Ph.D.	(2027)
Kamila Zdybal (visiting)	Ph.D.	2023
Elizabeth Armstrong	Ph.D.	2023
Hang Zhou	Ph.D.	2022
Joshua McConnell	Ph.D.	2019
Derek Cline	M.S.	2018
Mike Hansen	Ph.D.	2018
Siddartha Ravichandran	M.S.	2017
Michael Brown	M.S.	2017
Nathan Yonkee	M.S.	2015
Amir Biglari	Ph.D.	2015
Abhishek Bagusetty	M.S.	2014
Babak Goshayeshi	Ph.D.	2014
Christopher Earl	Ph.D.	2013
Devin Robison	M.S.	2013
Lyubima Simeonova	M.S.	2012
Naveen K, Punati	Ph.D.	2012
Alessandro Parente (visiting)	Ph.D.	2008

Post-Doctoral Researchers Supervised

- Joshua McConnell (2019-2021)
- Babak Goshayeshi (2015-2017)
- Christopher Earl (2013-2014)
- Tony Saad (2010-2012)

Funded Research Projects

2020-2024	NSF	$453,221	PI
2021-2023	DOE-SNL	$185,074	PI
2020-2020	Salt Lake County	$28,612	co-PI with T. Saad
2020-2021	DOE-SNL	$71,675	PI
2018-2020	DOE-SNL	$105,589	PI
2018-2022	DOE (EFRC)	$350,000	Senior personnel (Sutherland's budget)
2017-2022	NSF	$493,300	PI
2016-2018	DOE-SNL	$171,462	PI
2014-2019	DOE-NNSA (PSAAP-II)	$1,527,807	(co-PI, Sutherland's budget)
2013-2016	NSF	$700,000	co-PI with M. Berzins and M. Might
2013-2015	DOE-SNL	$71,918	PI
2013-2014	NSF	$10,000	PI
2012-2017	DOE-BES	$449,652	PI
2010-2013	DOE-NNSA	$639,704	PI
2010-2015	NSF	$704,480	co-PI with V. Pascucci (Sutherland's budget)
2009-2010	University of Utah	$22,400	PI
2008-2011	DOE	$307,000	PI

Peer Reviewed Publications

View my Google Scholar profile or my Mendeley profile.

[1] Elizabeth Armstrong and James C. Sutherland. Reduced-order modeling with reconstruction-informed projections. *Combustion and Flame*, 259:113119, jan 2024.

[2] Kamila Zdybal, Alessandro Parente, and C James. Improving reduced-order models through nonlinear decoding of projection-dependent outputs. *Patterns*, November 2023.

[3] Kamila Zdybał, Giuseppe D'Alessio, Antonio Attili, Axel Coussement, James C Sutherland, and Alessandro Parente. Local manifold learning and its link to domain-based physics knowledge. *Applications in Energy and Combustion Science*, Special issue: Machine Learning Methods for Reactive Flows, June 2023.

[4] Kamila Zdybał, Elizabeth Armstrong, Alessandro Parente, and James C Sutherland. PCAfold 2.0 – Novel tools and algorithms for low-dimensional manifold assessment and optimization. *SoftwareX*, 23:101447, 2023.

[5] Elizabeth Armstrong, Michael A Hansen, Robert C Knaus, Nathaniel A Trask, John C Hewson, and James C Sutherland. Accurate compression of tabulated chemistry models with partition of unity networks. *Combustion Science and Technology*, July 2022.

[6] Josh McConnell, Weston Ortiz, James C. Sutherland, Pania Newell, Anne M. Grillet, Anthony M. McMaster, Rajkumar B. Bhakta, and Rekha R. Rao. Computational modeling and experiments of an elastoviscoplastic fluid in a thin mold-filling geometry. *Journal of Non-Newtonian Fluid Mechanics*, June 2022.

[7] Elizabeth Armstrong, John C Hewson, and James C Sutherland. Characterizing Tradeoffs in Memory, Accuracy, and Speed for Chemistry Tabulation Techniques. *Combustion Science and Technology*, 195(11):2614–2633, jan 2022.

[8] Kamila Zdybał, Elizabeth Armstrong, C Sutherland, James, and Alessandro Parente. Cost function for low-dimensional manifold topology optimization. *Scientific Reports*, 12, 2022.

[9] Kamila Zdybał, James C. Sutherland, and Alessandro Parente. Manifold-informed state vector subset for reduced-order modeling. *Proceedings of the Combustion Institute*, 2022.

[10] Hang Zhou, Terry A Ring, and James C Sutherland. Additional criteria for MILD coal combustion. *Proceedings of the Combustion Institute*, 38(3):4233–4240, August 2021.

[11] Elizabeth Armstrong and James C. Sutherland. A technique for characterising feature size and quality of manifolds. *Combustion Theory and Modelling*, 25(4):646–668, June 2021.

[12] Hayden A Hedworth, Mokbel Karam, Josh McConnell, James C Sutherland, and Tony Saad. Mitigation strategies for airborne disease transmission in orchestras using computational fluid dynamics. *Science Advances*, 7(26):eabg4511, jun 2021.

[13] Mokbel Karam, James C. Sutherland, and Tony Saad. Low-cost Runge-Kutta integrators for incompressible flow simulations. *Journal of Computational Physics*, jun 2021.

[14] Qi Rao, Yidong Xia, Jiaoyan Li, Joshua McConnell, James Sutherland, and Zhen Li. A modified many-body dissipative particle dynamics model for mesoscopic fluid simulation: methodology, calibration, and application for hydrocarbon and water. *Molecular Simulation*, 47(4):363–375, mar 2021.

[15] Hang Zhou, Josh McConnell, Terry A. Ring, and James C. Sutherland. Characterization of temperature criteria using gas-phase fuel streams for mild coal combustion. *Fuel*, 296, 2021.

[16] Mokbel Karam, James C Sutherland, and Tony Saad. PyModPDE : A Python Software for Modified Equation Analysis. *SoftwareX*, 12, July 2020.

[17] Josh Mcconnell, Tony Saad, and James C Sutherland. An Explicit Low-Mach Projection Method for Modeling Flows with Finite-Rate Chemistry. In *AIAA Aviation Forum*, pages 1–19, Online, jun 2020.

[18] Josh Mcconnell and James C Sutherland. Assessment of Various Tar and Soot Treatment Methods for Use in Coal Combustion Simulation. *Fuel*, 265(1), 2020.

[19] Kamila Zdybał, Elizabeth Armstrong, Alessandro Parente, and James C. Sutherland. PCAfold: Python software to generate, analyze and improve PCA-derived low-dimensional manifolds. *SoftwareX*, 12, 2020.

[20] Brad Peterson, Alan Humphrey, Dan Sunderland, James Sutherland, Tony Saad, Harish Dasari, and Martin Berzins. Automatic Halo Management for the Uintah GPU-Heterogeneous Asynchronous Many-Task Runtime. *International Journal of Parallel Programming*, 47(5-6):1086–1116, dec 2019.

[21] Michael A. Hansen, Elizabeth Armstrong, and James C Sutherland. State space parameterization of explosive eigenvalues during autoignition. *Combustion and Flame*, 196:182–196, 2018.

[22] Michael A. Hansen and James C. Sutherland. On the consistency of state vectors and Jacobian matrices. *Combustion and Flame*, 193:257–271, 2018.

[23] Chris Earl, Matthew Might, Abhishek Bagusetty, and James C. Sutherland. Nebo: An efficient, parallel, and portable domain-specific language for numerically solving partial differential equations. *Journal of Systems and Software*, 125:389–400, March 2017.

[24] Michael A. Hansen and James C. Sutherland. Dual Timestepping Methods for Detailed Combustion Chemistry. *Combust. Theory Modelling*, 21(2):329–345, 2017.

[25] Josh Mcconnell, Babak Goshayeshi, and James C Sutherland. An Evaluation of the Efficacy of Various Coal Combustion Models for Predicting Char Burnout. *Fuel*, 201:53–64, 2017.

[26] Josh McConnell and James C. Sutherland. The effect of model fidelity on prediction of char burnout for single-particle coal combustion. *Proceedings of the Combustion Institute*, 36(2):2165–2172, 2017.

[27] Tony Saad, Derek Cline, James C. Sutherland, and R. Stoll. Scalable Tools for Generating Synthetic Isotropic Turbulence with Arbitrary Spectra. *AIAA journal*, 55(1):327–331, 2017.

[28] Tony Saad and James C Sutherland. Wasatch: An architecture-proof multiphysics development environment using a Domain Specific Language and graph theory. *Journal of Computational Science*, 17(3):639–646, may 2016.

[29] M A Hansen and J C Sutherland. Pseudo-transient continuation for combustion simulation with detailed reaction mechanisms. *SIAM Journal on Scientific Computing*, 38(2):B272–B296, April 2016.

[30] Naveen Punati, Haiou Wang, Evatt R. Hawkes, and James C. Sutherland. One-dimensional modeling of turbulent premixed jet flames - comparison to DNS. *Flow, Turbulence and Combustion*, pages 1–18, 2016.

[31] Tony Saad and James C Sutherland. Comment on "Diffusion by a Random Velocity Field" [Phys . Fluids 13 , 22 (1970)]. *Phys. Fluids*, 28(11), 2016.

[32] Nathan Yonkee and James C Sutherland. PoKiTT: exposing task and data parallelism on heterogeneous architectures detailed chemical kinetics, transport, and thermodynamics calculations. *SIAM Journal on Scientific Computing*, 38(5):S264–S281, 2016.

[33] Amir Biglari and James C Sutherland. An a-posteriori evaluation of principal component analysis-based models for turbulent combustion simulations. *Combustion and Flame*, 162(10):4025–4035, October 2015.

[34] Babak Goshayeshi and James C. Sutherland. A comparative study of thermochemistry models for oxy-coal combustion simulation. *Combustion and Flame*, 162(10):4016–4024, October 2015.

[35] Babak Goshayeshi and James C Sutherland. Prediction of Oxy-Coal Flame Stand-off Using High-Fidelity Thermochemical Models and the One-Dimensional Turbulence Model. *Proc. Combust. Inst.*, 35:2829–2837, 2015.

[36] Benjamin J. Isaac, Jeremy N. Thornock, James C. Sutherland, P. J. Smith, and A. Parente. Advanced regression methods for combustion modelling using principal components. *Combust. Flame*, 162(6):2592–2601, 2015.

[37] Babak Goshayeshi and James C. Sutherland. A comparison of various models in predicting ignition delay in single-particle coal combustion. *Combustion and Flame*, 161:1900–1910, February 2014.

[38] Alessandro Parente and James C. Sutherland. Principal component analysis of turbulent combustion data: Data pre-processing and manifold sensitivity. *Combustion and Flame*, 160(2):340–350, February 2013.

[39] John Schmidt, Martin Berzins, Jeremy Thornock, Tony Saad, and J. Sutherland. Large scale parallel solution of incompressible flow problems using uintah and hypre. In *Cluster, Cloud and Grid Computing (CCGrid), 2013 13th IEEE/ACM International Symposium on*, pages 458–465, 2013.

[40] Patrick K. Notz, Roger P. Pawlowski, and James C. Sutherland. Graph-Based Software Design for Managing Complexity and Enabling Concurrency in Multiphysics PDE Software. *ACM Transactions on Mathematical Software*, 39(1):1–21, November 2012.

[41] Amir Biglari and James C. Sutherland. A filter-independent model identification technique for turbulent combustion modeling. *Combustion and Flame*, 159:1960–1970, January 2012.

[42] A. Parente, J. C. Sutherland, B. B. Dally, L. Tognotti, and P. J. Smith. Investigation of the MILD combustion regime via Principal Component Analysis. *Proc. Combust. Inst.*, 33(2):3333–3341, 2011.

[43] N. Punati, J. C. Sutherland, A. R. Kerstein, E. R. Hawkes, and J. H. Chen. An Evaluation of the One-Dimensional Turbulence Model: Comparison with Direct Numerical Simulations of CO/H2 Jets with Extinction and Reignition. *Proc. Combust. Inst.*, 33(1):1515–1522, 2011.

[44] J. C. Sutherland, N. Punati, and A. R. Kerstein. A Unified Approach to the Various Formulations of the One-Dimensional Turbulence Model. Technical Report ICSE091201, Institute for Clean and Secure Energy, The University of Utah, Salt Lake City, UT, 2010.

[45] A. Parente, J. C. Sutherland, P. J. Smith, and L. Tognotti. Identification of Low-Dimensional Manifolds in Turbulent Flames. In *Proc. Combust. Inst.*, volume 32, pages 1579–1586. The Combustion Institute, 2009.

[46] J. Sutherland and A. Parente. Combustion modeling using principal component analysis. *Proc. Combust. Inst.*, 32(1):1563–1570, 2009.

[47] E. R. Hawkes, R. Sankaran, J. C. Sutherland, and J. H. Chen. Scalar Mixing in Direct Numerical Simulations of Temporally-Evolving Plane Jet Flames with Detailed CO/H2 Kinetics. In *Proc. Combust. Inst.*, volume 31, pages 1633–1640, 2007.

[48] J. C. Sutherland, P. J. Smith, and J. H. Chen. A Quantitative Method for A Priori Evaluation of Combustion Reaction Models. *Combust. Theory Modelling*, 11(2):287–303, 2007.

[49] J. C. Sutherland, P. J. Smith, and J. H. Chen. Quantification of Differential Diffusion in Nonpremixed Systems. *Combust. Theory Modelling*, 9(2):365–383, May 2005.

[50] E. R. Hawkes, R. Sankaran, J. C. Sutherland, and J. H. Chen. Direct Numerical Simulation of Turbulent Combustion - Fundamental Insights Towards Predictive Models. In *Journal of Physics: Conference Series*, volume 16, pages 65–79, 2005.

[51] J. C. Sutherland and C. A. Kennedy. Improved Boundary Conditions for Viscous, Reacting, Compressible Flows. *J. Comp. Phys.*, 191(2):502–524, 2003.

Book Chapters & Reports

[1] K. Zdybał, M. R. Malik, A. Coussement, J. C. Sutherland, and A. Parente. *Reduced-Order Modeling of Reacting Flows Using Data-Driven Approaches*, pages 245–278. Springer International Publishing, 2023.

[2] Kamila Zdybał, Giuseppe D Alessio, Gianmarco Aversano, Mohammad Rafi Malik, James C Sutherland, and Alessandro Parente. Advancing Reacting Flow Simulations with Data-Driven Models. In Miguel A. Mendez Brunton, Andrea Ianiro, Bernd R. Noack, and Steven L., editors, *Data-Driven Fluid Mechanics: Combining First Principles and Machine Learning*, chapter 15, pages 304–329. Cambridge University Press, 2023.

[3] Hang Zhou, Josh McConnell, Terry A. Ring, and James C. Sutherland. Insights of MILD Combustion from High-Fidelity Simulations. In Junfu Lyu, editor, *Clean Coal and Sustainable Energy*, pages 59–81. Shuiqing Li, 2022.

[4] Eric C Cyr, Eric Phipps, Michael A Heroux, Jed Brown, Ethan T Coon, Robert C Kirby, Tzanio V Kolev, James C Sutherland, and R Trott. Algorithms and Abstractions for Assembly in PDE Codes : Workshop Report - SAND2015-1379. Technical report, Sandia National Laboratories, Albuquerque, NM, 2015.

[5] T. Echekki, A. R. Kerstein, and J. C. Sutherland. The One-Dimensional Turbulence (ODT) Model. In T. Echekki and E. Mastorakos, editors, *Turbulent Combustion Modeling: Advances, New Trends and Perspectives.*, chapter 11, pages 249–276. Springer, 2011.

[6] Yang Wang, Raghurama Reddy, Roberto Gomez, Junwoo Lim, Sergiu Sanielevici, Jaideep Ray, James Sutherland, and Jackie Chen. *Current Trends in High Performance Computing and Its Applications: Proceedings of the International Conference on High Performance Computing and Applications, August 8–10, 2004, Shanghai, P.R. China*, chapter A General Approach to Creating Fortran Interface for C++ Application Libraries, pages 145–154. Springer Berlin Heidelberg, Berlin, Heidelberg, 2005.

Invited & Keynote Talks

[1] James C Sutherland. Progress in using machine learning to create high-fidelity combustion models. In *Joint meeting of NSF, AFRL and ONR combustion research programs*, February 2024.

[2] James C. Sutherland, Tony Saad, and Josh Mcconnell. An Approach for Pressure Projection in Variable Density Flows. In *CalTech (Invited talk)*, Pasedena, CA, dec 2019.

[3] James C Sutherland. Multiphysics Modeling on Modern Computing Architectures - Challenges and Opportunities. Auckland, NZ, nov 2019.

[4] James C. Sutherland. Panelist: Future science and technologies of clean coal utilazition. In *9th International Symposium on Coal Combustion*, Qingdao, China, July 2019.

[5] Hang Zhou, Josh Mcconnell, Terry A Ring, and James C Sutherland. Insights on Coal Combustion from High-Fidelity Simulations. In *9th International Symposium on Coal Combustion*, Qingdao, China, July 2019.

[6] James C. Sutherland. A Review of the Current State of Coal Combustion. Baoding, China, December 2018.

[7] James C Sutherland. An Assessment of Coal Modeling Approaches: The Effects of Model Fidelity on Predictivity. Beijing, China, December 2018.

[8] James C. Sutherland. New Horizons for Coal? Number December. Baoding, China, December 2018.

[9] James C Sutherland. An Assessment of Coal Modeling Approaches: The Effects of Model Fidelity on Predictivity. Suttgart, Germany, July 2018.

[10] James C. Sutherland. Progress and Prospective for Extreme-Scale Reacting Flow Simulations. Albuquerque, NM, July 2018.

[11] James C Sutherland. Multiscale Physics, Algorithms & Computers. John Zink Company, Tulsa, OK, May 2018.

[12] James C Sutherland. Tools and Techniques for Multiscale Simulation of Reacting Flows. Shanghai Jiao Tong University, Shanghai, China, March 2018.

[13] James C Sutherland and Martin Rieth. Turbulence-Chemistry Interaction in Coal Flames. In *2nd Workshop on Measurement and Simulation of Coal and Biomass Conversion*, Orlando, FL, April 2017.

[14] James C. Sutherland. Tools and Techniques to Enable Extreme- Scale Simulation of Reacting Flows. Sandia National Laboratories, Albuquerque, NM, July 2016.

[15] James C. Sutherland. Tools and techniques for multiscale simulation of reacting flows. Anhui University of Technology, Ma'anshan, China, March 2016.

[16] James C. Sutherland. Models, Algorithms and Software for Next-Generation Combustion Simulation. In *NIST*, Gaithersburg, MD, May 2015.

[17] James C. Sutherland. Multiscale Modeling on Multiscale Computers. In *5th International Conference on Coupled Thermo-Hydro-Mechanical-Chemical (THMC) Processes in Geosystems*, Salt Lake City, UT, February 2015. Keynote Address.

[18] James C. Sutherland. High Fidelity Models for Tractable Simulation of Turbulent Reacting Flows. Sandia National Laboratories, Livermore, CA, September 2013.

[19] James C. Sutherland. Scalable Multiphysics Software Design for Emerging HPC Architectures. Sandia National Laboratories, Livermore, CA, September 2013.

[20] James C Sutherland. Low-Dimensional Techniques for Modeling Turbulent Reacting Flow. Sandia National Laboratories, Albuquerque, NM, July 2012.

[21] James C. Sutherland. Programming Paradigms for Scientific Computing at Exascale. Brussels, Belgium, 2012.

[22] James C. Sutherland. Software Design Paradigms for Massively Parallel Multiphysics Applications Acknowledgments. Sandia National Laboratories, Albuquerque, NM, July 2011.

[23] James C. Sutherland. Dimension Reduction in Combustion Modeling. DOE BES Combustion Contractor Meeting, Virginia, June 2011.

[24] James C Sutherland. Taming Complexity in Multiphysics Software Design Overview & Motivation. Sandia National Laboratories, Albuquerque, July 2009.

[25] James C. Sutherland. Combustion Modeling & Simulation : Challenges and Opportunities Challenges for Turbulent Combustion Modeling. In *23rd Annual ACERC Conference*, Provo, UT, 2009.

[26] James C. Sutherland and Alessandro Parente. Managing Thermochemical Complexity in CFD. In *Workshop on Fire Models & Validation*, Salt Lake City, UT, September 2007.

[27] James C. Sutherland. DNS & its Role in Validation of Mixing & Reaction Models. In *Workshop on Heat Transfer in Pool Fires*, Salt Lake City, UT, 2004.

Conference Presentations

[1] Elizabeth Armstrong and James C Sutherland. Improvement of data-based reduced-order combustion models. In *US National Combustion Meeting*, College Station , TX, March 2023.

[2] James C. Sutherland and Kamila Zdybał. Topological characteristics of low-dimensional manifolds in reduced-order modeling of turbulent combustion. In *SIAM Computational Science and Engineering*, Amsterdam, Netherlands, March 2023.

[3] Kamila Zdybał, Riccardo Malpica Galassi, James C. Sutherland, and Alessandro Parente. Reduced-order modeling with a regression-aware autoencoder. In *SIAM Computational Science and Engineering*, Amsterdam, Netherlands, March 2023.

[4] Kamila Zdybał, Alessandro Parente, and James C Sutherland. Reduced-order modeling of reacting flows with a regression-aware autoencoder. In *US National Combustion Meeting*, College Station , TX, March 2023.

[5] K Zdybał, J C Sutherland, and A Parente. On the effect of manifold topology in reduced-order modeling of turbulent combustion. 5 2023.

[6] Elizabeth Armstrong, Michael A. Hansen, Robert C Knaus, Nathaniel A. Trask, John C Hewson, and James C. Sutherland. Improving Chemistry Tabulation with Partition of Unity Networks. In *18th International Conference on Numerical Combustion*, La Jolla, California, 2022.

[7] Elizabeth Armstrong, Kamila Zdybał, Alessandro Parente, and James C. Sutherland. A Cost Function for Optimizing Manifold Topology in Reduced-Order Modeling. In *Western States Section of the Combustion Institute*, Palo Alto, CA, 2022.

[8] Kamila Zdybal, Elizabeth Armstrong, James C Sutherland, and Alessandro Parente. Cost function for assessing the quality of low-dimensional manifolds. In *SIAM Conference on Mathematics of Data Science*, San Diego, CA, 2022.

[9] Kamila Zdybał, Mohammad Rafi Malik, Elizabeth Armstrong, C Sutherland, James, and Alessandro Parente. Characterizing manifold topologies for reduced-order modeling. In *18th International Conference on Numerical Combustion*, page 3, La Jolla, California, 2022.

[10] Hang Zhou, Josh Mcconnell, Terry A Ring, and James C Sutherland. Insights on Coal Combustion from High-Fidelity Simulations. In *18th International Conference on Numerical Combustion*, La Jolla, California, 2022.

[11] Hang Zhou and James C Sutherland. An Analysis of the Required Scalar Dissipation Rate and Minimum Particle Size for MILD Coal Combustion. In *Western States Section of the Combustion Institute*, pages 1–8, Palo Alto, CA, 2022.

[12] Elizabeth Armstrong and James C. Sutherland. A Characterization of Tradeoffs in Memory, Accuracy, and Speed for Chemistry Tabulation Techniques. In *12th US National Combustion Meeting*, College Station, TX, 2021.

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