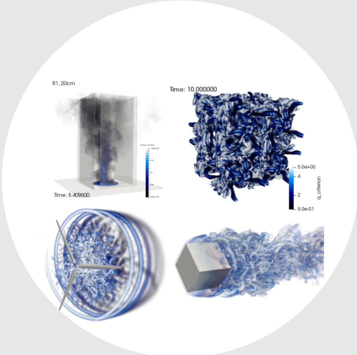

Stefan P. Domino

Computational Scientist

01 January 2019

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What I Do

I transform people's understanding of the world by deploying high-performing computational fluid dynamics tools. While some draw analogy to such computational tools as the rasp in Michelangelo's hand, I choose to view the partnership analogous to that of the luthier and the violinist in that both are required to make new that which was formerly unheard.

Skills

- low-Mach Fluids
- Turbulence
- NGP
- Software Development
- Outgoing
- Driven
- Passionate

(*)[Scale ranges from 0 (Fundamental Awareness) to 6 (Expert).]

Interests

My professional interest rests in the development and deployment of computational fluid dynamics tools, which can be used in a wide range of applications, to facilitate a transformative understanding of otherwise intractable physical phenomena. By using these tools, in partnership with theory and experiments, a window within complex coupled processes can be unsealed. Studying low-Mach multi-physics applications that include turbulence, variable density effects, buoyancy, and chemical reactions often times reveals extraordinarily complex fluids, thermal, and species structures thereby allowing that which is generally unseen to be fully appreciated. Fostering partnerships within a diverse and high-performing team required to solve grand-challenge problems provides motivation to work in the complex field of CFD.

Education

1999 — Doctor of Philosophy — Chemical Engineering, University of Utah
Research advanced modeling and simulation techniques in an effort to more accurately predict the oxides of Nitrogen (NOx) in pulverized coal furnaces

Peer-reviewed Publications

2020 — A Multi-physics computational investigation of droplet pathogen transport emanating from synthetic coughs and breathing; Domino, Pierce, Hubbard; Accepted to Atomization and Spray.

2019 — Eigensensitivity analysis of subgrid-scale stresses in large-eddy simulation of a turbulent axisymmetric jet; Jofre, Domino, Iaccarino, Int J. Heat Trans.

2019 — An assessment of atypical mesh topologies for low-Mach large-eddy simulation; Domino, Sakievich, and Barone; Comput. & Fluids, 179 (30).

2018 — Design-order, non-conformal low-Mach fluid algorithms using a hybrid CVFEM/DG approach; Domino; J.Comp. Physics, 359 (15).

2018 — A framework for characterizing structural uncertainty in large-eddy simulation closures; Jofre, Domino, and Iaccarino; Flow Turb.& Comb., 100 (2).

Awards

2017 — Sheldon R. Tieszen Engineering Sciences Award for extensive technical excellence.

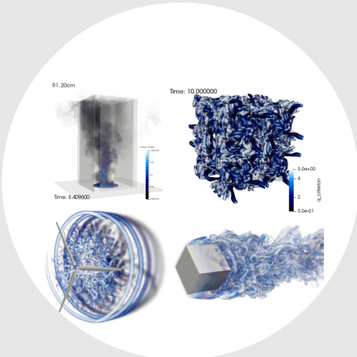
Experience

2005-now — Principal Member of the Technical Staff — Sandia National Laboratories
Principal Investigator for a ASC Verification and Validation and Physics and Enginnering Models centering on LES and model development activities; originator of the open-source Nalu code base.

2001-2005 — Senior Member of the Technical Staff — Sandia National Laboratories
Principal Investigator and lead developer for the generally unstructured, massively parallel Sierra low-Mach module Fuego code base. This fire mechanics simulation tool supports NNSA's mission of Science-based Stockpile Stewardship.

2000-2001 — Postdoctoral appointee — Sandia National Laboratories
Development of smoke transport simulation tools for use in cargo bay fires.

1996-2000 — Research Assistant — University of Utah
Graduate student within the chemical engineering department focused on computational approaches for improved NOx prediction.



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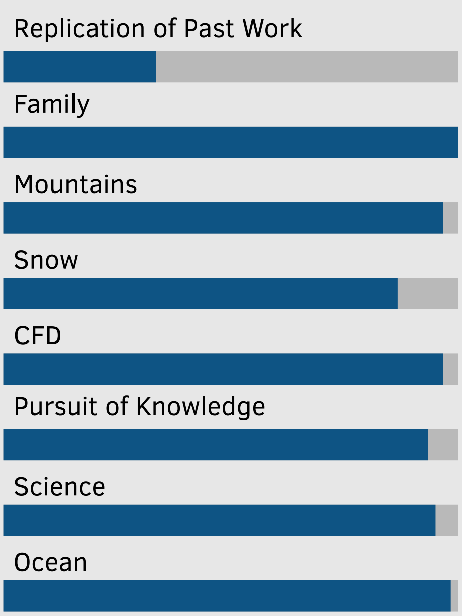
Why I do it

The ability to explore multi-physics applications from a foundational modeling and simulation perspective is critical to future scientific advances. This high-level motivation has driven my desire to work within the intersection of physics elucidation, numerical methods development, and code development. More recently, the ability to deploy advanced uncertainty quantification (UQ) techniques to drive physics understanding, which may include structural uncertainty methods, machine learning approaches, etc., has transformed the former research paradigm.

Favorite Things



(*)[Scale ranges from 0 (not-so favorite) to 6 (no question).]

Goals

My primary career goals are to extend the state-of-the art in computational fluid dynamics to facilitate the advanced deployment and acceptance of this tool to support a wide and novel range of multi-physics applications. Mentoring, teaching, and motivating the next generation of computational scientists also represents a core passion.

Select Publications

2018	The suitability of hybrid meshes for low-Mach large-eddy simulation; Domino, Jofre, and Iaccarino; Proceedings of the 2018 Center for Turbulence Research Summer Program; Stanford University.
2018	Characterization of structural uncertainty in large-eddy simulation of a circular jet; Domino, Jofre, and Iaccarino; Center for Turbulence Research Annual Research briefs; Stanford University.
2018	Uncertainty quantification in LES of channel flow; Safta, Blaylock, Templeton, Domino, and Najm; IJNMF., 83 (4).
2017	Multifidelity uncertainty quantification using spectral stochastic discrepancy models; Eldred, Ng, Barone, and Domino; In: Ghanem R., Higdon D., Owhadi H. (eds) Handbook of Uncertainty Quantification.
2016	Exploring model-form uncertainties in large-eddy simulations; Domino, Jofre, and Iaccarino; Proceedings of the 2016 Center for Turbulence Research Summer Program; Stanford University.
2014	A comparison between low-order and higher-order low-Mach discretization approaches; Domino; Proceedings of the 2014 Center for Turbulence Research Summer Program; Stanford University.
2013	A reflection of recent ASC milestones in support of the abnormal/thermal environment; Domino; Sandia National Laboratories Technical Report, SAND2013-3927P.
2010	Towards verification of sliding mesh algorithms for complex applications using MMS; Domino; Proceedings of the 2010 Center for Turbulence Research Summer Program; Stanford University.

Noteworthy Experiences

2020	Co-taught Stanford's ME469 Mechanical Engineering Graduate Computational Fluid Mechanics class.
2018	Guest lecturer for Stanford's ME469 Mechanical Engineering Graduate Computational Fluid Mechanics class.
2006-2018	Six-time visiting scholar at Stanford's Center for Turbulence Research.
2000-2018	Numerous internal and external peer-review processes supported, e.g., journals, DOE and NSF panels, etc.).

References

Please contact me for a comprehensive list of references.

Review

Dr. Stefan Domino is a computational domain specialist researcher who develops tools and techniques to support advancement of multi-physics understanding of complex phenomena including turbulent fluid mechanics, heat transfer, and chemical reactions.