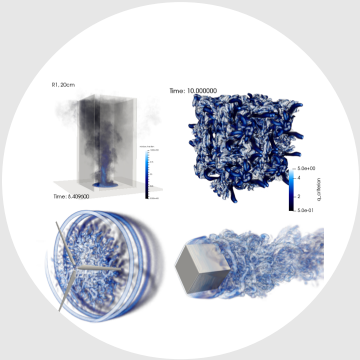

Stefan P. Domino Ph.D.

Computational Scientist

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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/Attributes

- low-Mach Fluids*
- Turbulence
- Next-generation-platforms
- Software Development
- Outgoing
- Driven
- Passionate

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

Interests

My professional interest resides in the development and deployment of computational fluid dynamics (CFD) tools to facilitate a transformative understanding of otherwise intractable physical phenomena. By exercising these tools, in partnership with theory and experiments, a window into complex coupled processes can be illuminated. Studying low-Mach multi-physics applications that include turbulence, variable-density effects, buoyancy, multiphase, 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 to solve grand-challenge problems provides me with ample motivation to work in the complex field of CFD.

Education

1999 — Doctor of Philosophy — Chemical Engineering, University of Utah
Researched and deployed advanced modeling and simulation techniques to more accurately predict the oxides of nitrogen (NO_x) in multiphase combustion applications.

Current Position(s) Held

Sandia — Computational Scientist; Engineering Science (1500).

Stanford — Adjunct Professor; School of Engineering, Institute for Computational and Mathematical Engineering (ICME), https://icme.stanford.edu.

COMERI — CEO/President/Chief Scientist; https://comeri.org.

Recent Peer-reviewed Publications

2021 — Domino, S. P., Hewson, J., Knaus, R., Hansen, M., *Predicting large-scale pool fire dynamics using an unsteady flamelet- and large-eddy simulation-based model suite*, Phys. Fluids, https://doi.org/10.1063/5.0060267 (Editor's pick).

2021 — Domino, S. P., *A case study on pathogen transport, deposition, evaporation and transmission: linking high-fidelity computational fluid dynamics simulations to probability of infection*, Int. J. CFD, https://doi.org/10.1080/10618562.2021.1905801.

2021 — Domino, S. P., Pierce, F., Hubbard, J., *A multi-physics computational investigation of droplet pathogen transport emanating from synthetic coughs and breathing*, Atom. Sprays, https://doi.org/10.1615/AtomizSpr.2021036313.

2019 — Jofre, L., Domino, S. P., Iaacarino, G., *Eigensensitivity analysis of subgrid-scale stresses in large-eddy simulation of a turbulent axisymmetric jet*, Int. J. Heat Mass, https://doi.org/DOI:10.1016/J.IJHEATFLUIDFLOW.2019.04.014.

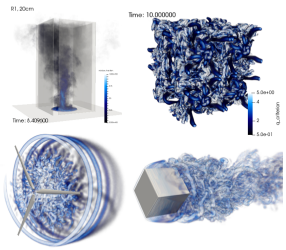
2019 — Domino, S. P., Sakievich, P., Barone, M., *An assessment of atypical mesh topologies for low-Mach large-eddy simulation*, Comp. Fluids, https://doi.org/10.1016/j.compfluid.2018.12.002.

2018 — Domino, S. P., *Design-order, non-conformal low-Mach fluid algorithms using a hybrid CVFEM/DG approach*, J. Comput. Phys., https://doi.org/10.1016/j.jcp.2018.01.007.

2018 — Jofre, L., Domino, S. P., Iaacarino, G., *A framework for characterizing structural uncertainty in large-eddy simulation closures*, Flow Turb. Combust., https://doi.org/10.1007/s10494-017-9844-8.

Goals

My primary career goal centers on extending state-of-the art in CFD methods to facilitate the advanced deployment of credible tools that support a wide range of atypical, e.g., fire, wind/wave-energy, computational ethology, etc., multi-physics applications. Mentoring, teaching, and motivating the next generation of computational scientists captures my core passion.



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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

Replication of Past Work*

Family

Mountains

Snow

CFD

Pursuit of Knowledge

Science

Ocean

(*)[Scale ranges from 0 (unfavorable) to 6 (favorable).]

Recent Experience

2005-now Principal Member of the Technical Staff — Sandia National Laboratories

My experience at Sandia rests within low-Mach turbulent fluid mechanics methods development for complex systems that drive the coupling of mass, momentum, species and energy transport. As PI, my research projects reside within the intersection of physics model development, numerical methods research, V&V techniques exploration, and high-performance computing and coding methods for low-Mach turbulent flow. I am the originator of the BSD open-source Nalu code base, https://github.com/NaluCFD. In my role as a technical staff, I am proud to have served the Lab's response to National crises such as Deep Water Horizon and the COVID-19 pandemic.

2020-now Adjunct Professor — Stanford/ICME

Co-teaching responsibilities for Stanford's ME469 Mechanical Engineering graduate CFD class where Nalu is used as pedagogical tool to bridge foundational numerical methods development and practical production CFD. I also support the mentoring of graduate students and post-doctoral candidates.

2018-now CEO/President/Senior Technical Staff — COMERI

Lead the management, research, and funding objectives for the Computational Marine Ethology Research Institute (COMERI) - a 501(c)(3) nonprofit research Institute that drives foundational understanding of marine ethology using first-principles physics.

2001-2005 Senior Member of the Technical Staff — Sandia National Laboratories

PI and lead developer for the generally unstructured, massively parallel Sierra/Fuego code base and team contributor to the NNSA Defense Programs Awards of Excellence for significant contributions Stockpile Stewardship Program.

2000-2001 Postdoctoral appointee — Sandia National Laboratories

Development of a smoke transport simulation tool for cargo bay fires in support of the FAA's response to ValueJet Flight 592. This work was recognized as part of the NASA Associate Administrator's Choice Award for Outstanding Accomplishment, (Glenn Research Center) and a R&D 100 Award for the development of a multi-parameter, micro-sensor-based low false alarm fire detection system.

Noteworthy Experiences

2000-now Various PI roles (former and ongoing) for Sandia National Laboratories multi-year projects ranging from $50K-1500K per year.

2006-2018 Six-time visiting scholar at Stanford's CTR.

2000-now Numerous internal and external peer-reviews supported including journals, DOE panels, NSF, and others.

2000-now Mentoring of post-doctoral researchers and graduate student interns.

Awards

2017 Sheldon R. Tieszen SNL Engineering Sciences Award for a distinguished career in pursuit of technical excellence.

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.