Welcome &
SU2 Year in Review

SU2 Foundation Board
1st Annual SU2 Conference
Virtual
June 10-12, 2020

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Welcome to the

~~5th Annual SU2 Developers Meeting~~

1st Annual SU2 Conference!

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Original Motivation

"Computational analysis tools have revolutionized the way we design engineering systems, but most established codes are proprietary, unavailable, or prohibitively expensive for many users. The SU2 team is changing this, making ***multiphysics analysis and design optimization*** *freely available as* ***open-source*** *software and* ***involving everyone*** *in its creation and development."*

SU2 website circa Oct 2012

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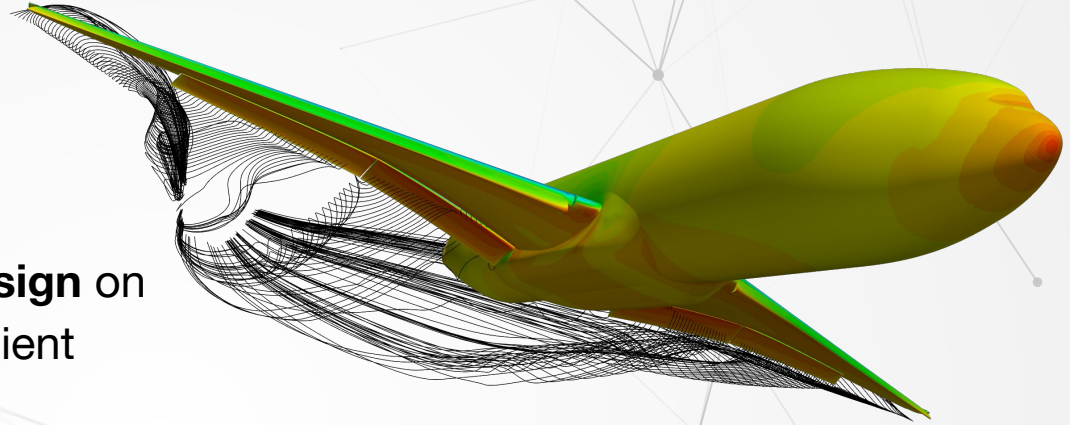
Key Technology



- SU2 is a software package for **multiphysics analysis and design** on unstructured meshes with gradient availability through adjoints.
- **Open-source**: released under the LGPL 2.1 license and available freely on GitHub.
- **Reusable, readable, and portable**: research platform for CFD, multiphysics, adjoint methods, HPC, and more.
- **HPC-ready:** C++/MPI/OpenMP core with a Python layer for automation.

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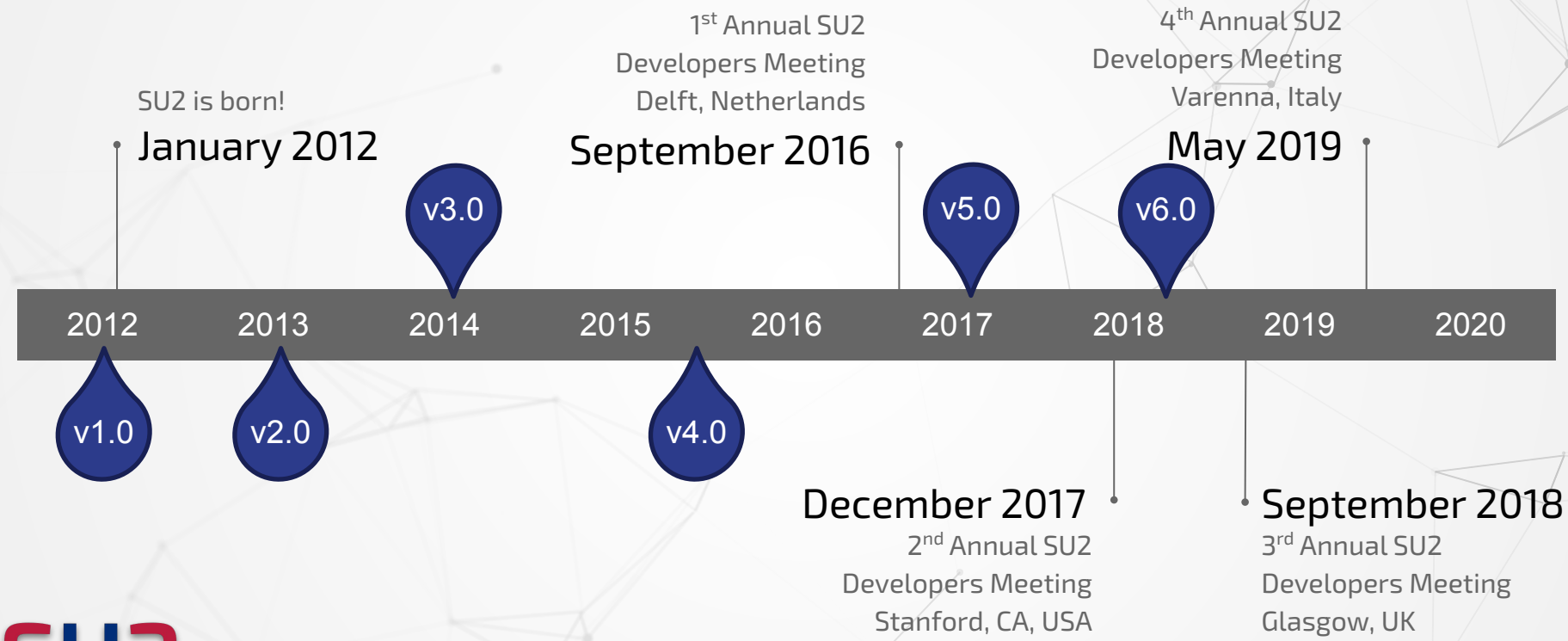
Key Milestones



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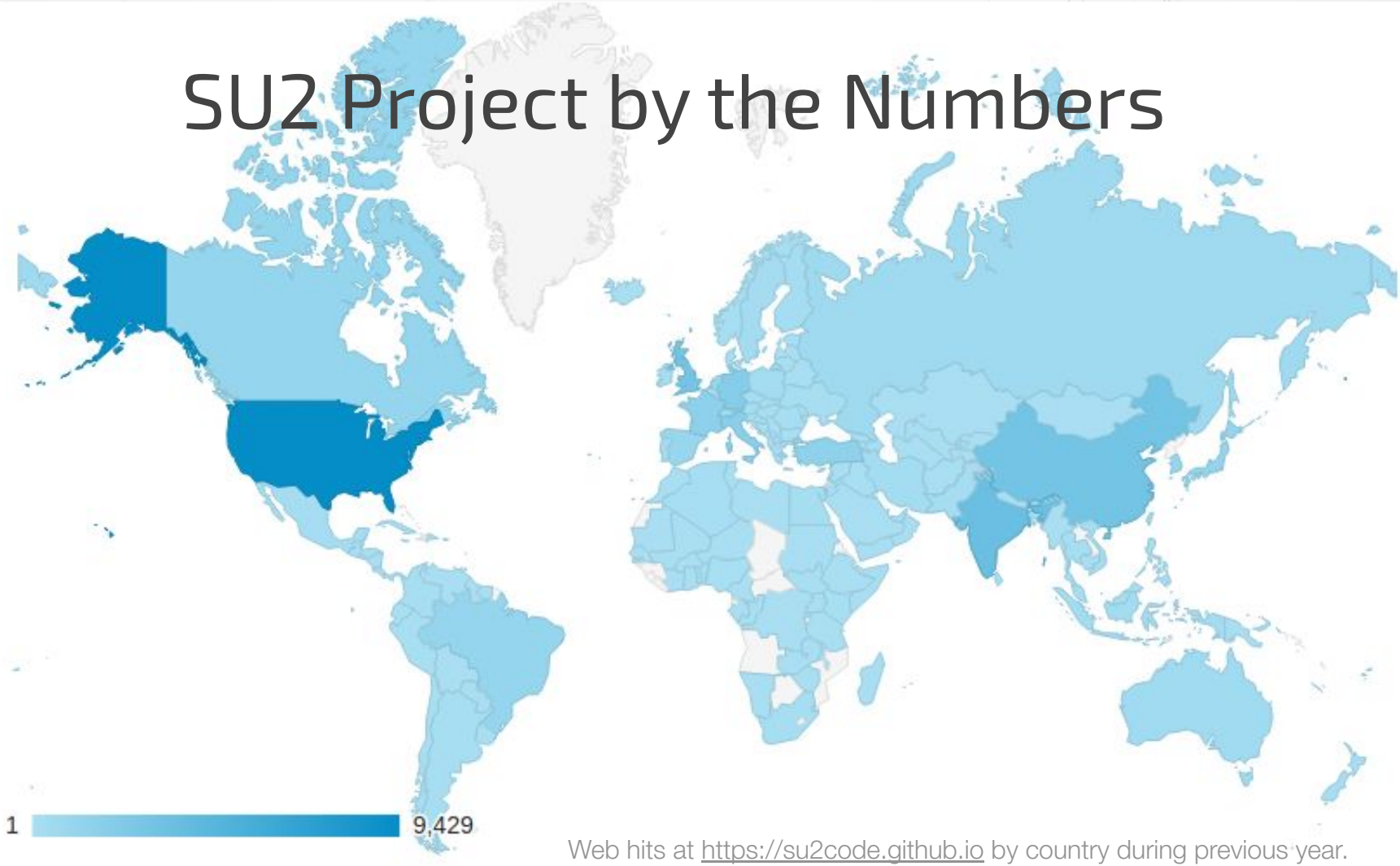
SU2 Project by the Numbers



Web hits at https://su2code.github.io by country during previous year.

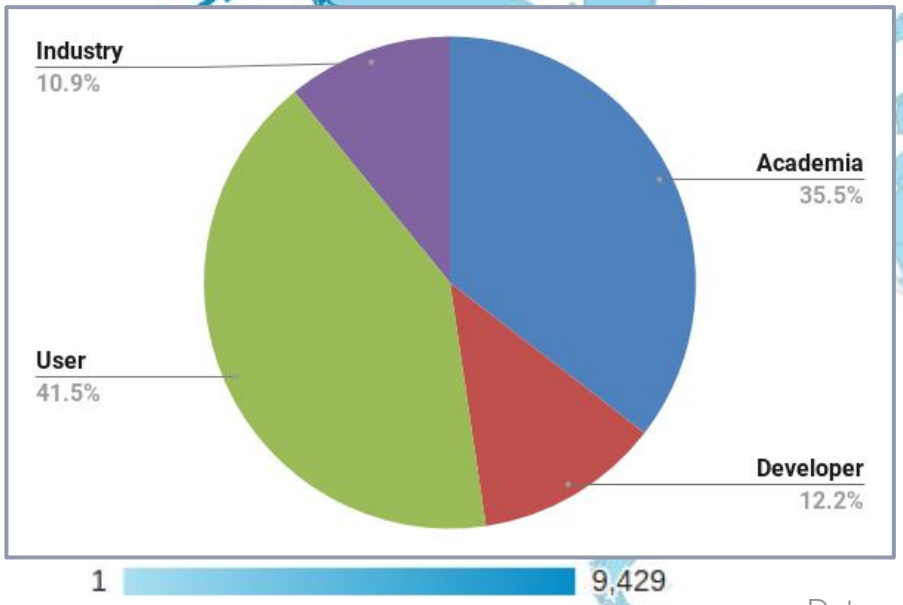
SU2 Project by the Numbers

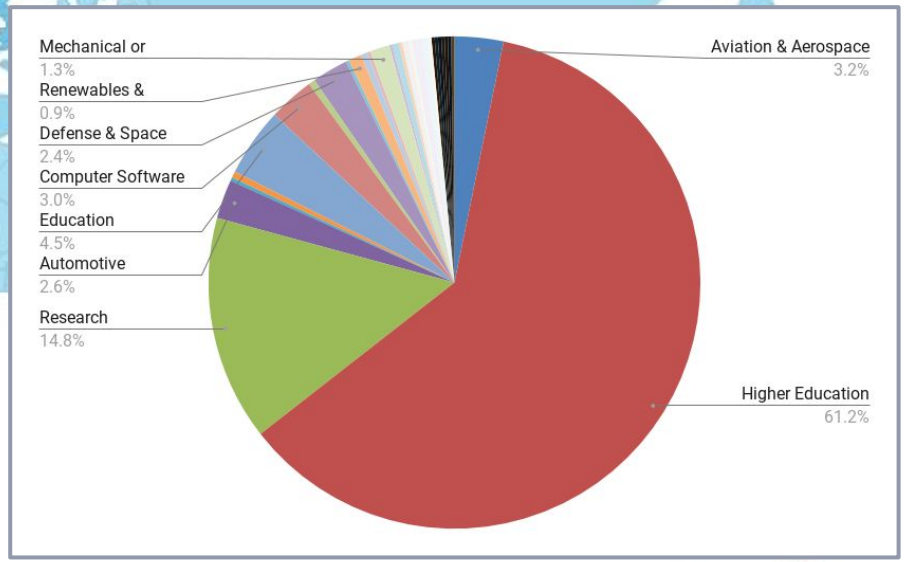
2,000+ Registered on Email List

6,000+ Repository Visits Every 2 Weeks

1,000+ Repository Clones Every 2 Weeks

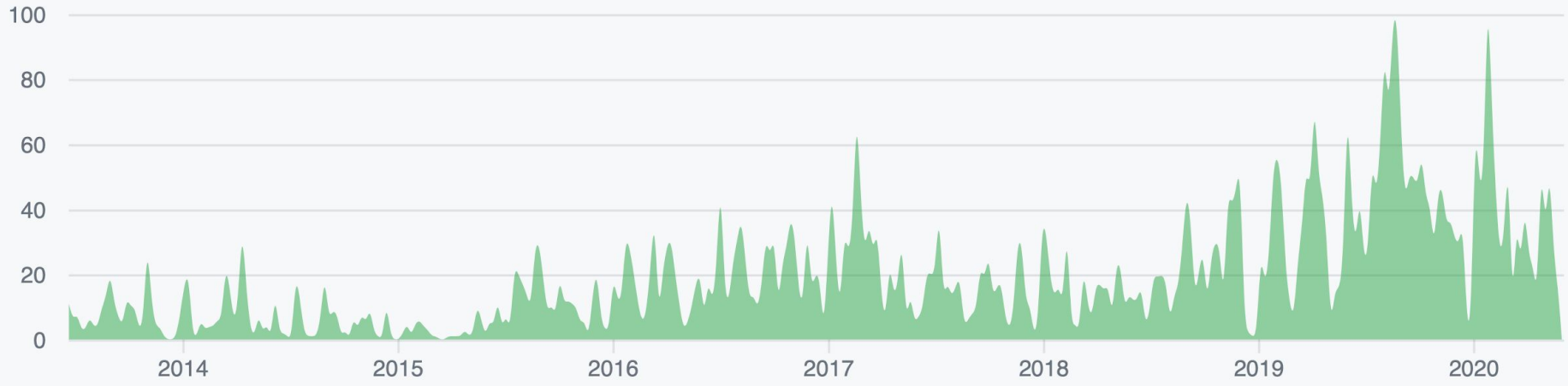
10,000+ Downloads of GitHub Releases





Data accessed from Hubspot / GitHub repository during June 2020.

SU2 Development by the Numbers



Commits to the SU2 repository at https://github.com/su2code/SU2.

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SU2 Development by the Numbers

163k Lines of C/C++ Code as of v7.0.5*

154 Pull Requests Since June 2019

378 Continuous Regression/Unit Tests

207 Active Branches in Repository

4207 Commits to ‘master’ Since v6.2.0

496 Active Forks on GitHub

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Data accessed from GitHub repository during June 2020.
Excludes lines of code in externals/

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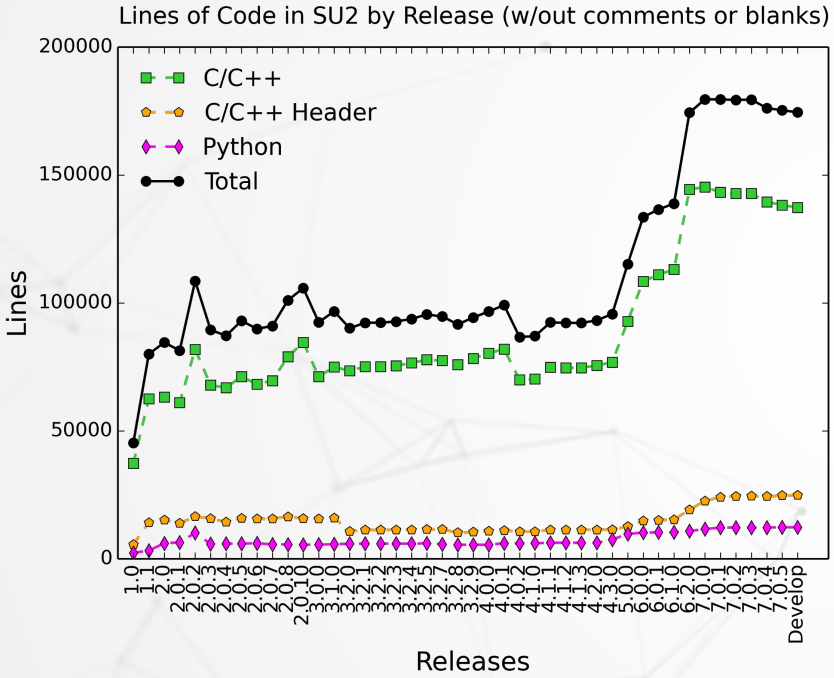
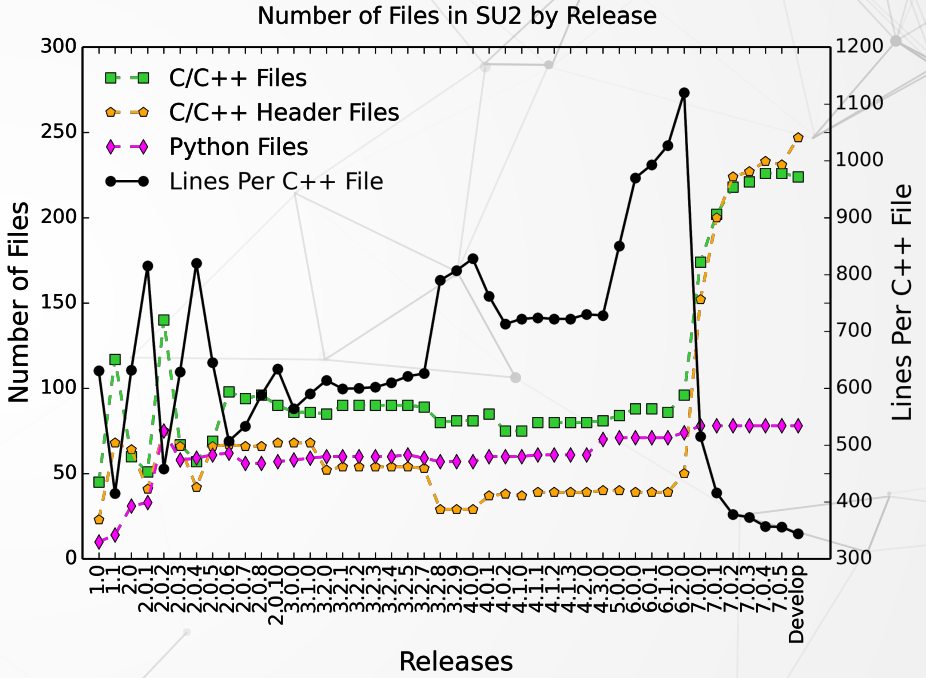
Since v7.0: More Capability. Less Code. Better Organized.





To learn how we develop, see the talk by T. Albring on Thurs!

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Excludes lines of code in externals/

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SU2 Community Impact Over the Years

1000s of users, 100s of developers, dozens of institutions

generating

1000s of commits, 100s of pull requests, dozens of releases

attracting

1000s of repository visits, 100s of repository clones every two weeks

outputting

1000s of hours of training, 100s of research papers, dozens of theses

for educational and research purposes, and counting...

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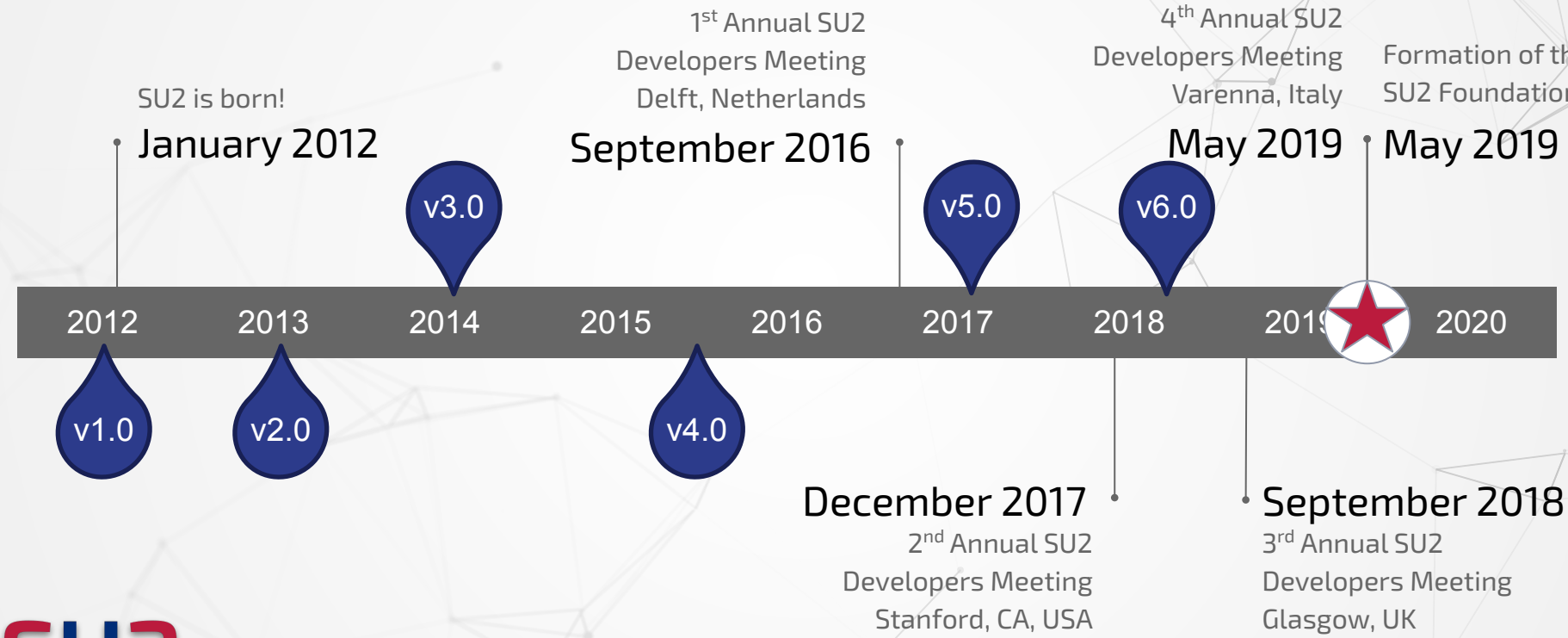
Key Milestones



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How do we sustain and scale up?
Well-established Capabilities: FVM, adjoints, etc.
Shiny New Research
Critical Infrastructure: IO, MPI, Class Design
New Interfaces and Coupling for Multiphysics

SU2 FOUNDATION
1225 4th ST #333
SAN FRANCISCO, CA 94158

A Not-for-Profit, Nonstock
Delaware Corporation
(USA)

Pursuing 501(c)(3) Status

SU2
foundation

Our Mission:

(a) promote global software development and education to increase the pace of innovation in the engineering sciences for the public benefit of all society;

(b) provide a neutral forum for community collaboration by offering efficient infrastructure and technical governance;

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info@su2foundation.org

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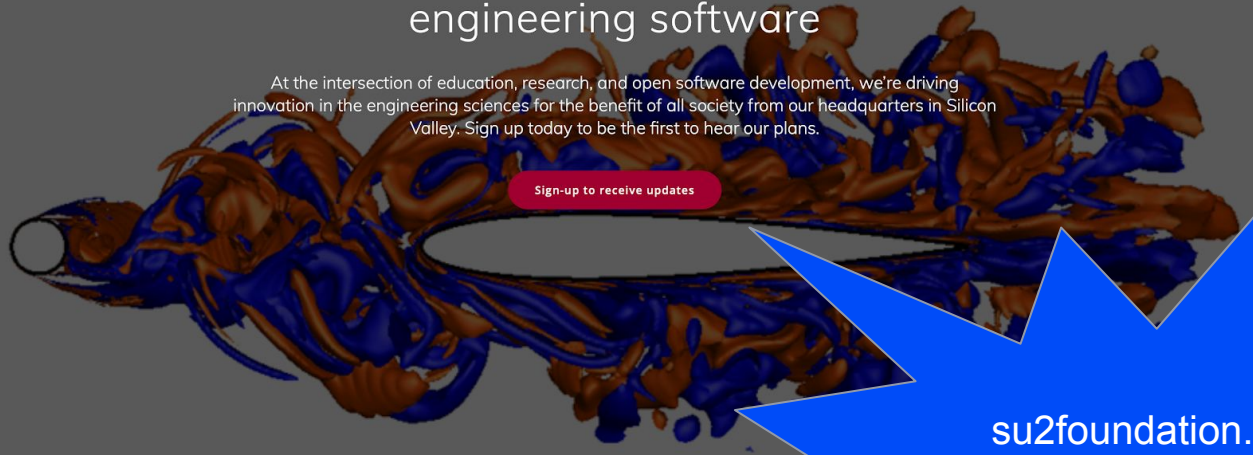
PROJECTS ACTIVITIES WORKING GROUPS ABOUT US SU2 Code

Promoting open innovation in engineering software

At the intersection of education, research, and open software development, we're driving innovation in the engineering sciences for the benefit of all society from our headquarters in Silicon Valley. Sign up today to be the first to hear our plans.

Sign-up to receive updates



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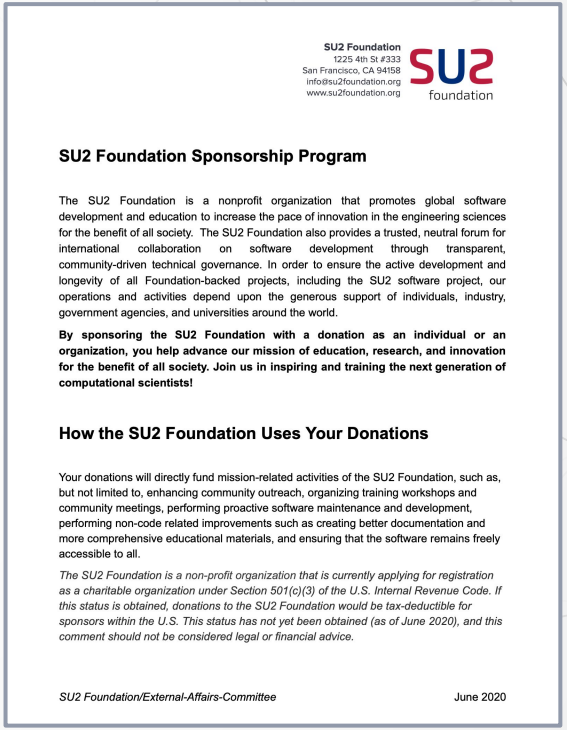
SU2 Foundation Sponsorship Program

- Advancing our nonprofit mission depends upon the generous support of individuals and organizations all around the world.
- Today, we're officially announcing the **SU2 Foundation Sponsorship Program**!
- Recognizing our donors at 4 levels:
  - Pioneer
  - Innovator
  - Investigator
  - Collaborator
- White paper on the benefits of involvement with the SU2 community coming soon.



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SU2 Foundation Sponsorship Program

The SU2 Foundation is a nonprofit organization that promotes global software development and education to increase the pace of innovation in the engineering sciences for the benefit of all society. The SU2 Foundation also provides a trusted, neutral forum for international collaboration on software development through transparent, community-driven technical governance. In order to ensure the active development and longevity of all Foundation-backed projects, including the SU2 software project, our operations and activities depend upon the generous support of individuals, industry, government agencies, and universities around the world.

By sponsoring the SU2 Foundation with a donation as an individual or an organization, you help advance our mission of education, research, and innovation for the benefit of all society. Join us in inspiring and training the next generation of computational scientists!

How the SU2 Foundation Uses Your Donations

Your donations will directly fund mission-related activities of the SU2 Foundation, such as, but not limited to, enhancing community outreach, organizing training workshops and community meetings, performing proactive software maintenance and development, performing non-code related improvements such as creating better documentation and more comprehensive educational materials, and ensuring that the software remains freely accessible to all.

The SU2 Foundation is a non-profit organization that is currently applying for registration as a charitable organization under Section 501(c)(3) of the U.S. Internal Revenue Code. If this status is obtained, donations to the SU2 Foundation would be tax-deductible for sponsors within the U.S. This status has not yet been obtained (as of June 2020), and this comment should not be considered legal or financial advice.

SU2 Foundation/External-Affairs-Committee June 2020

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Our Generous Sponsors

- Pioneer Level: Robert Bosch LLC

See the talk by D. Mayer today!

See the talk by T. Kattmann Thursday!

See the talk by F. Belbute-Peres Friday!

- Collaborator Level: Delft University of Technology, University of Twente, Politecnico di Milano, National Institute of Aerospace (NIA)

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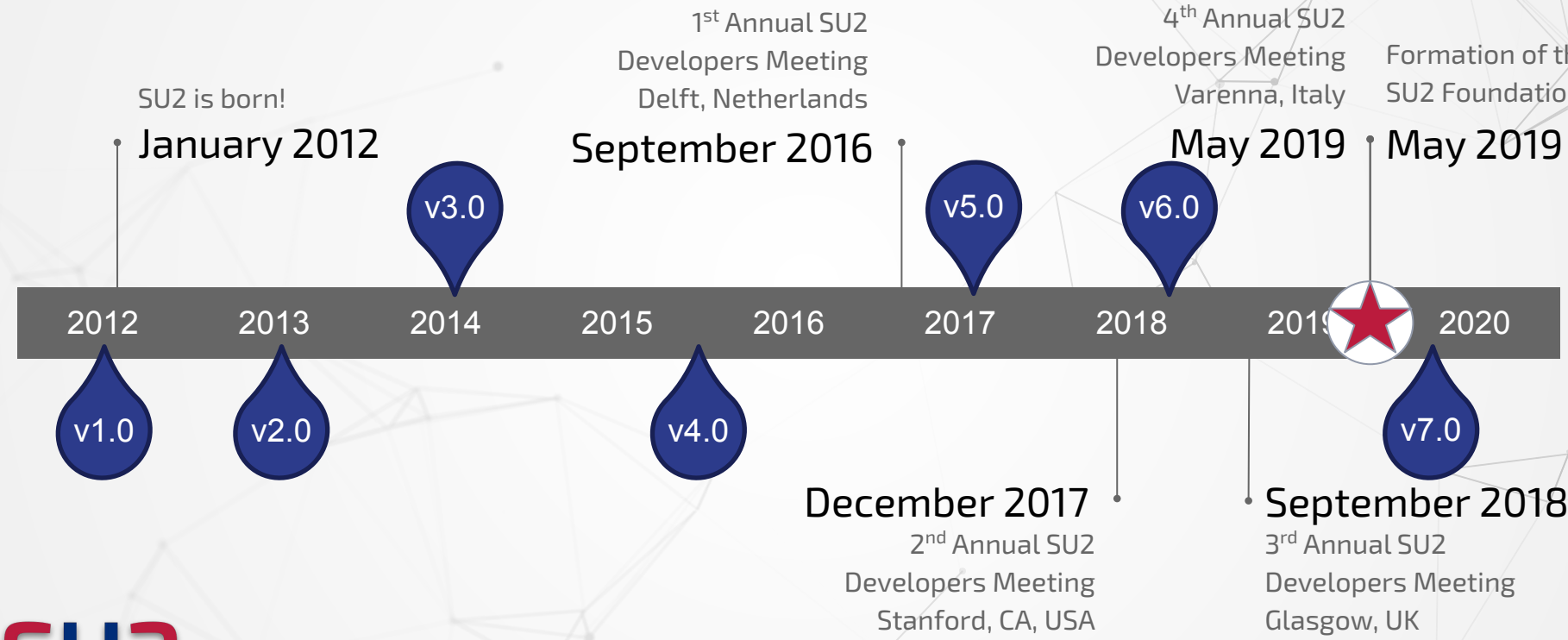
Key Milestones



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To be discussed in a featured talk during the event.

Development Highlights

- Addition of hybrid OpenMP/MPI (#1009, #975, #861, ...)
- Modernization to C++11 throughout codebase (ongoing)
- Compilation speedup of ~10x (#853)
- New unit testing framework (#850)
- Automated release workflow (#813)
- Wider CI coverage on more platforms with GitHub Actions (#806)
- Algorithmic improvements / performance optimizations for up to ~10x speedup, more robustness, and scalability (#790, #753, #728, #652, ...)
- Addition of fully user-customizable output (#728)
- New solution verification framework (#672)
- Too many more to include!

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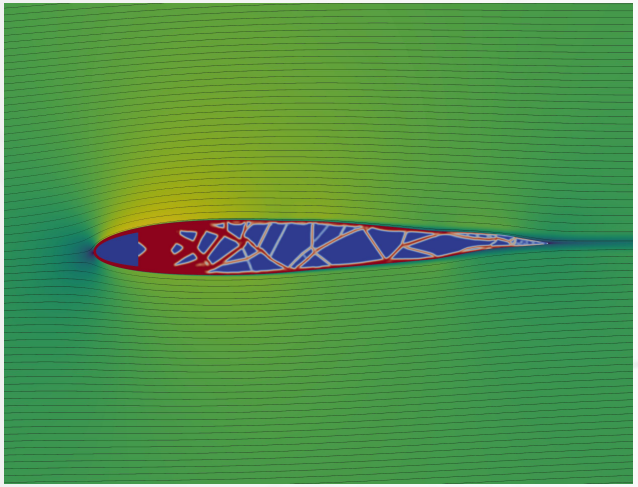
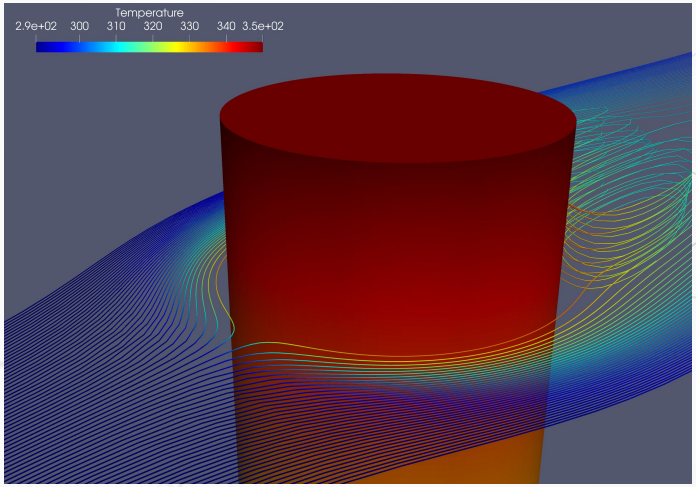
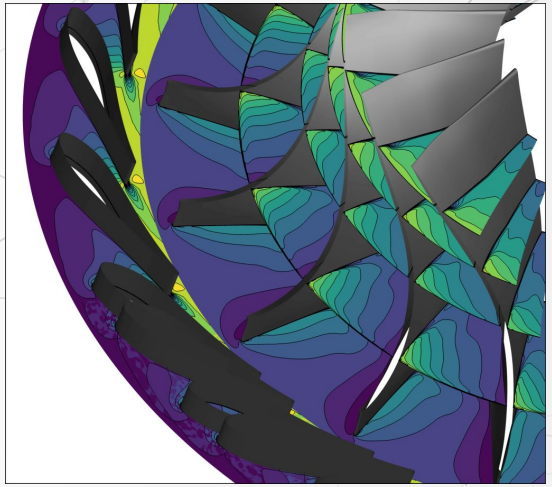
SU2 In Action



Topology Optimization



Multiphysics / CHT



Turbomachinery

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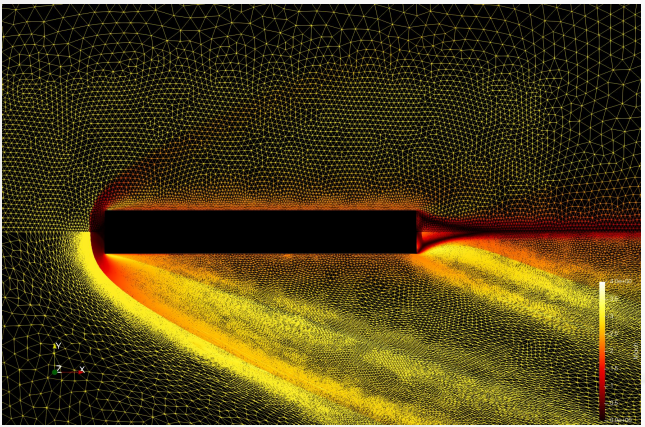
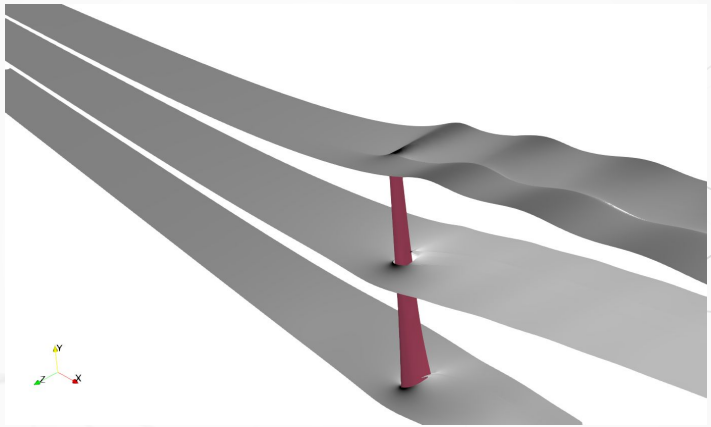


Mesh Adaptation



Pressure-based
Incompressible Solver
/ Wind Turbine Aero

Supporting the
Worldwide Ventilator
Effort

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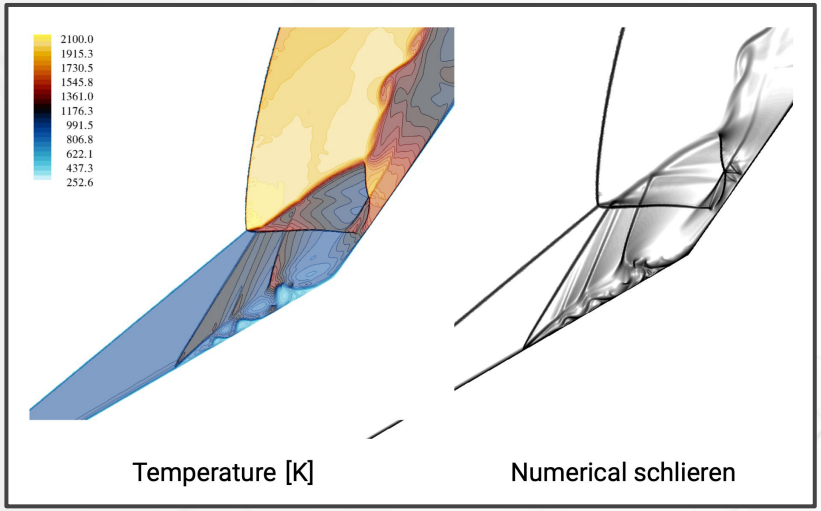
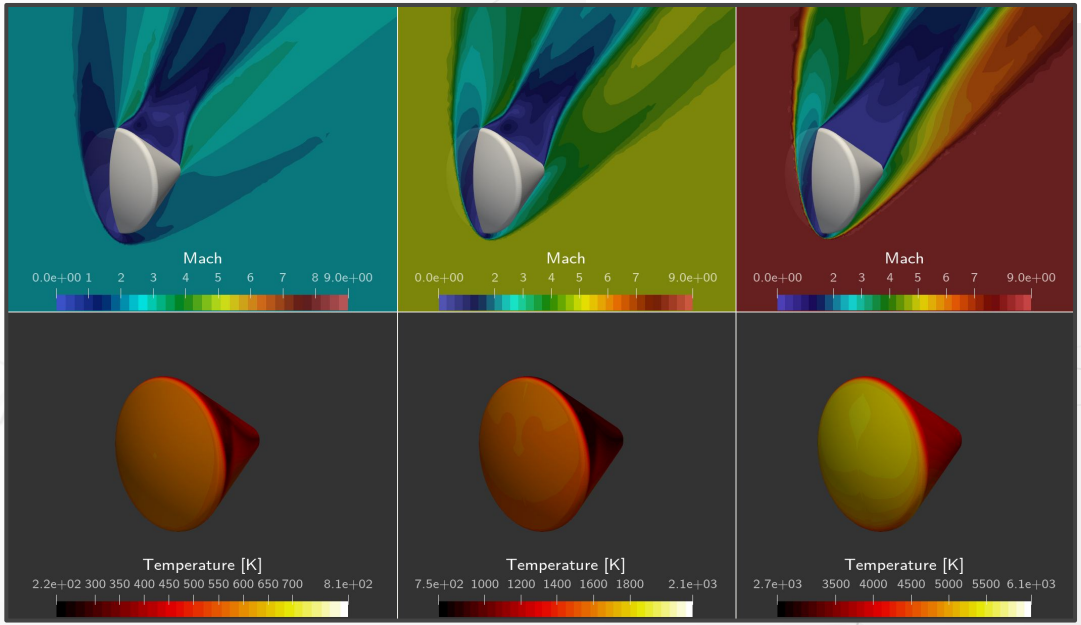
High-speed, Non-equilibrium Flows



From left to right:
Mach 2.5, 5.0 and 9.0

	Axial Force coefficient	*Normal force coefficient*
SU2	-0.8654	0.2041
Exp.	-0.88	0.20

Aero coefficients for Mach 9 case



See the talk by C. Garbacz!

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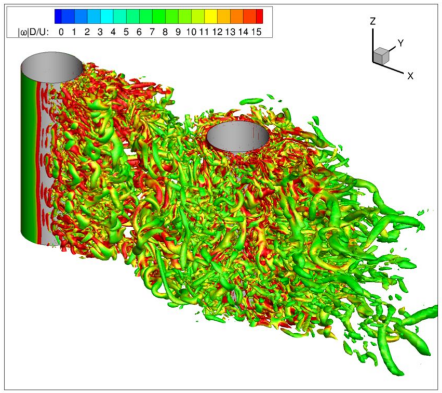
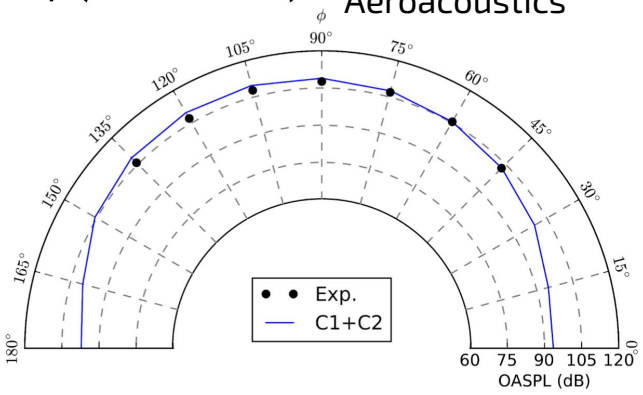
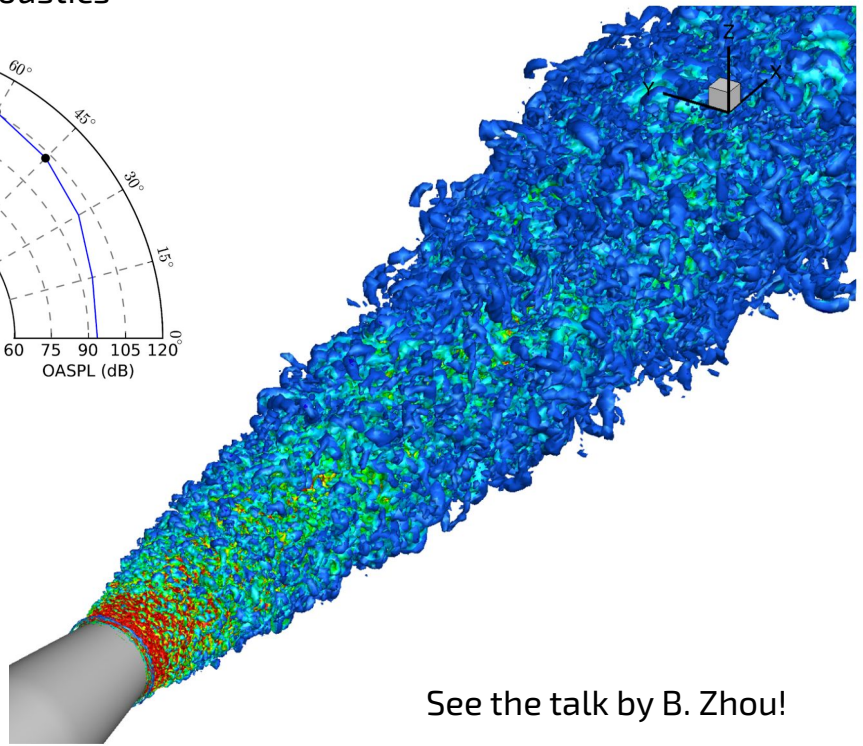
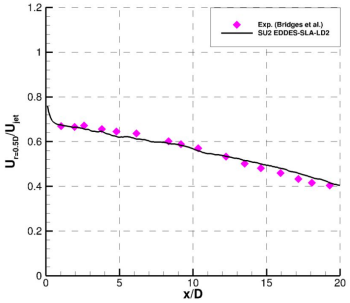
Scale-resolving Flows + Aeroacoustics

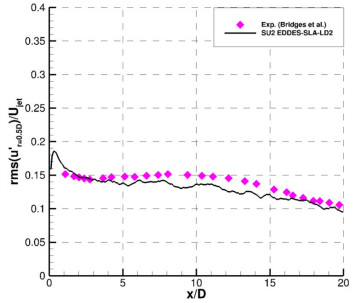








Mean velocity along lip-line



RMS of u' along lip-line

See the talk by B. Zhou!

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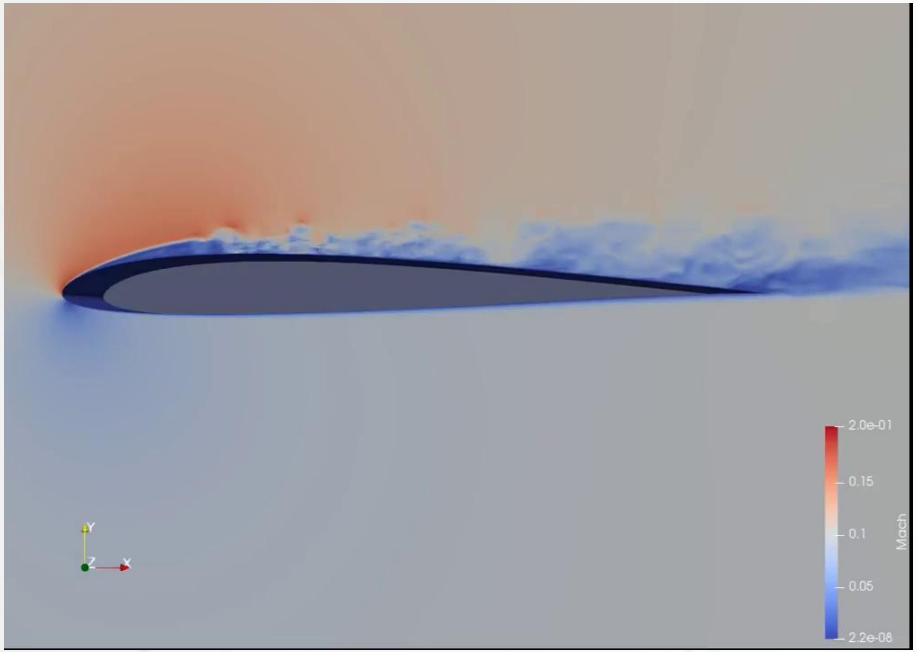

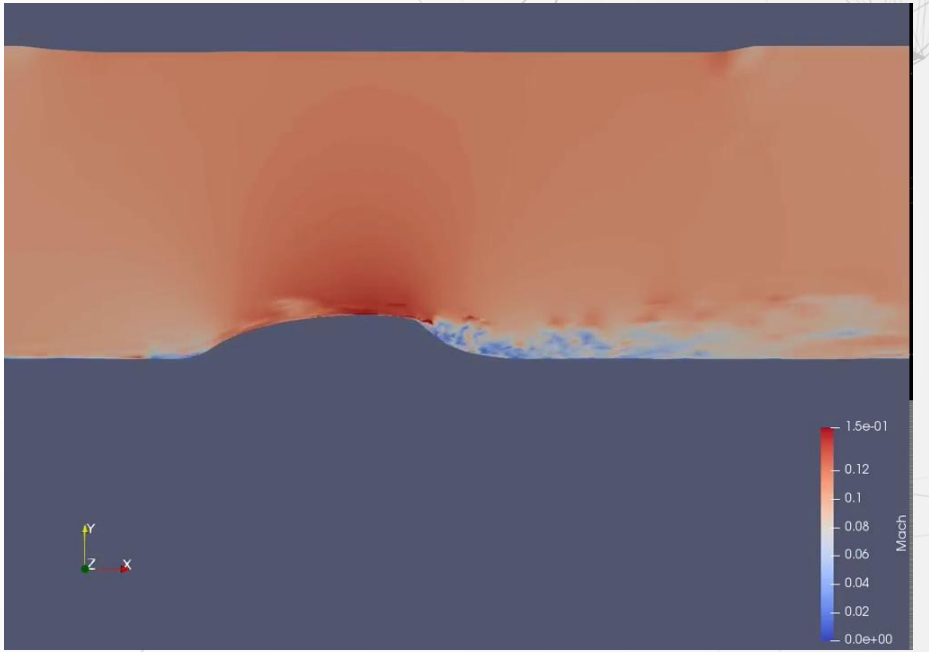

DG-FEM iLES / FVM WMLES

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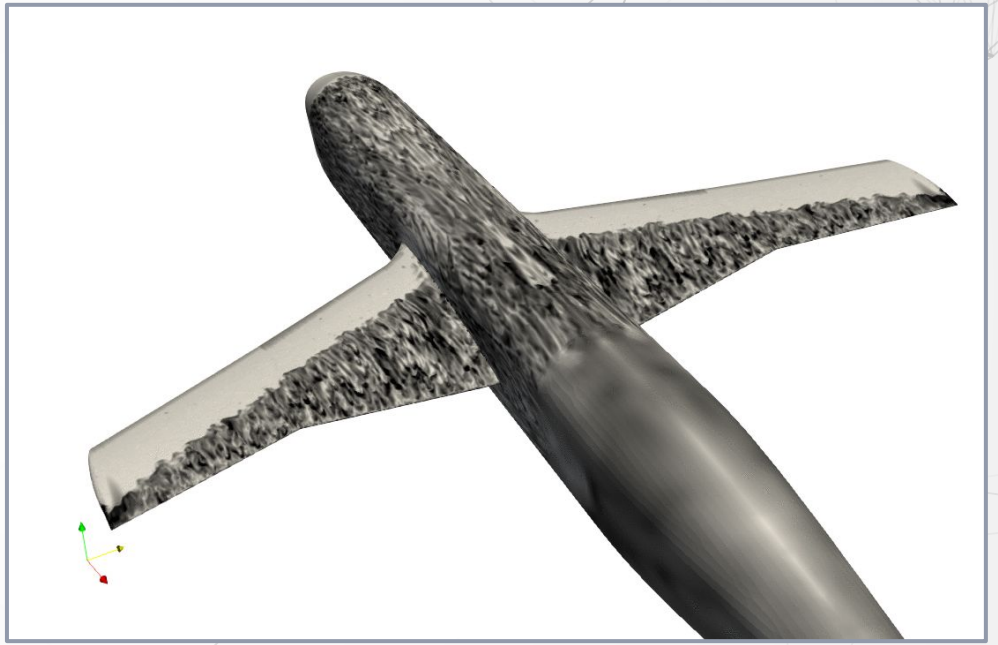
See the talk by E. Molina!



FVM WMLES of the LAGOON &
(Preliminary) NASA Juncture
Flow Geometries

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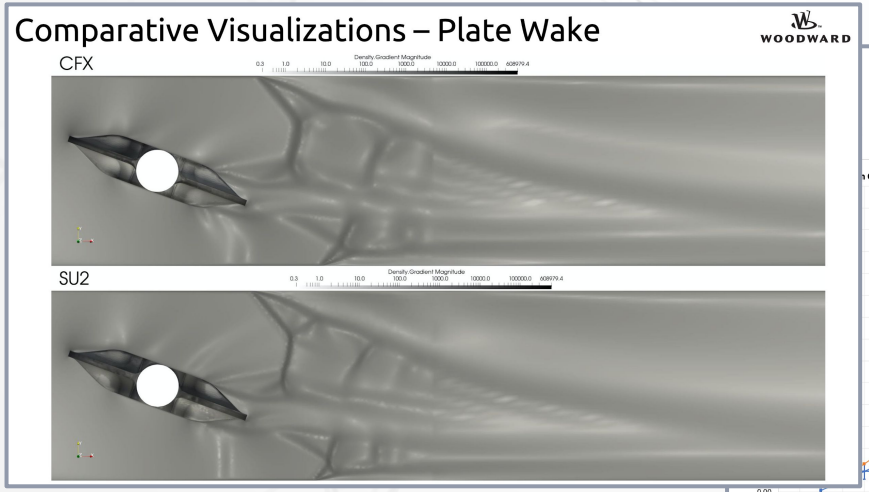
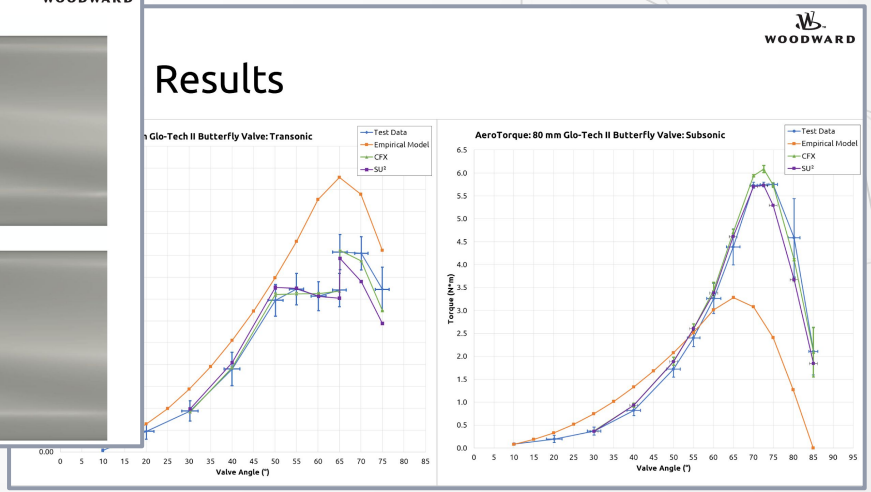
The Virtual Program

- 25 live talks: featured and lightning formats
  - The talks will be recorded and posted to the web afterwards
  - Please leave your questions in the GTW chat for 4 min Q&A after each
- Additional contributions on the web: slides and video uploads
  - https://su2foundation.org/su2conference2020/



See the slides by B. Gleeson!



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Day 1 – Agenda – Wednesday, June 10

Time (PDT)	Title	Speaker
07:00-07:30	Welcome; SU2 Year in Review	T. Economon
07:30-08:00	DDES and WMLES scale-resolving Simulations in SU2	E. Molina
08:00-08:30	Hybrid Parallelization of SU2	P. Gomes
08:30-08:40	Break	
08:40-08:55	Adjoint-based design optimization of pollutant emissions in heat exchangers	D. Mayer
08:55-09:10	Overview of aeroacoustic prediction and design capabilities in SU2	B. Zhou
09:10-09:25	SU2-NEMO: NonEquilibrium MOdels for Hypersonic Flows Using Mutation++	C. Garbacz
09:25-09:40	Effect of roughness on wind turbine performance	A. K. Ravishankara
09:40-09:55	Coupled adjoint sensitivities in problems involving turbulent flows, radiation and conjugate heat transfer	R. Sanchez
9:55-10:30	Talk to the Experts: Q&A about anything SU2	TBD
10:30	Adjourn	

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https://su2foundation.org/su2conference2020/

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Join us on our mission of education, research, and innovation for the benefit of all society!

Here's how you can get involved:

- Join our email list at **su2foundation.org**
- Get in on the action on GitHub: **https://github.com/su2code/SU2**
- Contact us about SU2 Foundation programs and sponsorship: **info@su2foundation.org**

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