

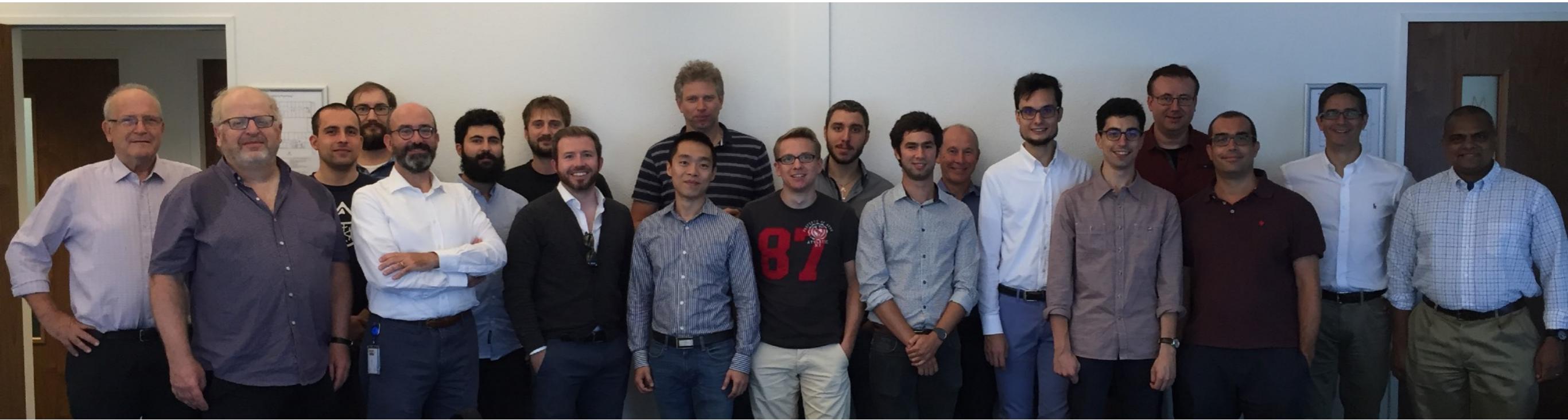


Welcome & Year in Review

Prof. Juan J. Alonso, Dr. Thomas D. Economon, and Dr. Francisco Palacios

3rd Annual SU2 Developers Meeting
University of Strathclyde
Glasgow, Scotland
September 17, 2018

Welcome Developers!



1st Annual SU2 Developers Meeting, September 2016, TU Delft

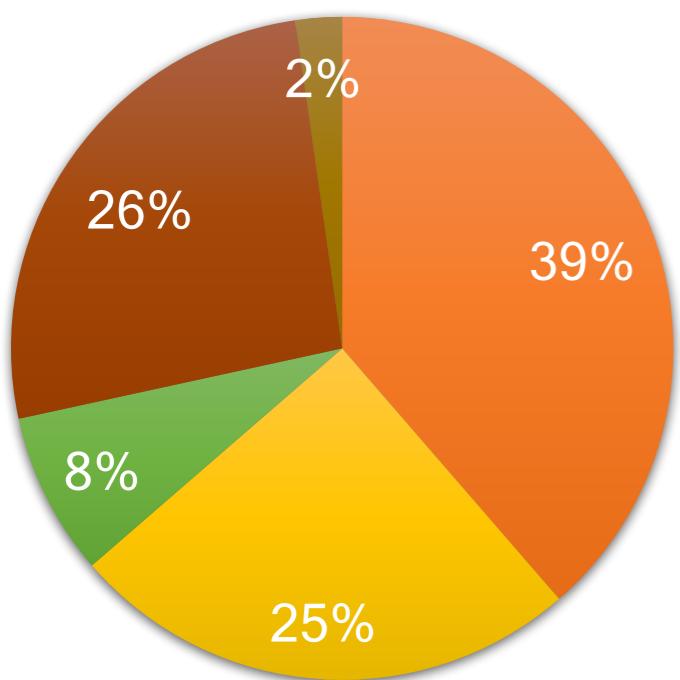
Welcome Developers!



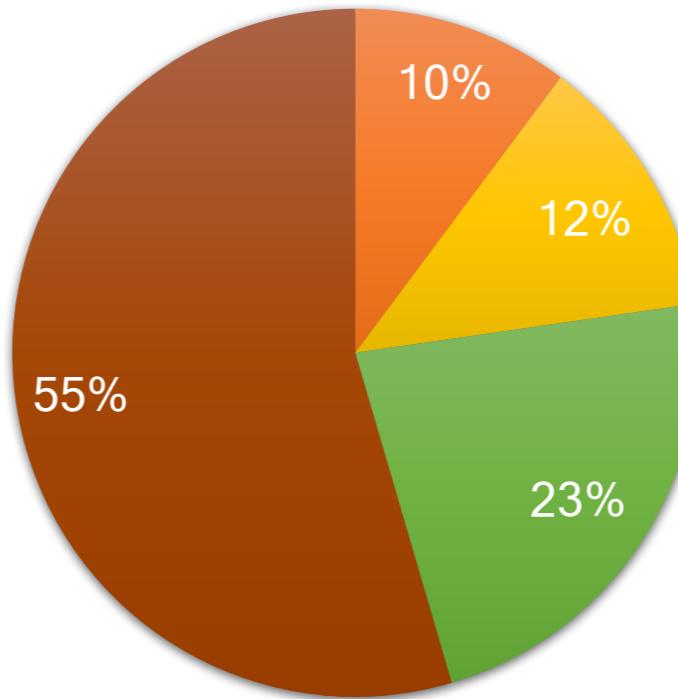
2nd Annual SU2 Developers Meeting, December 2017, Stanford University

Welcome to the Meeting - Demographics

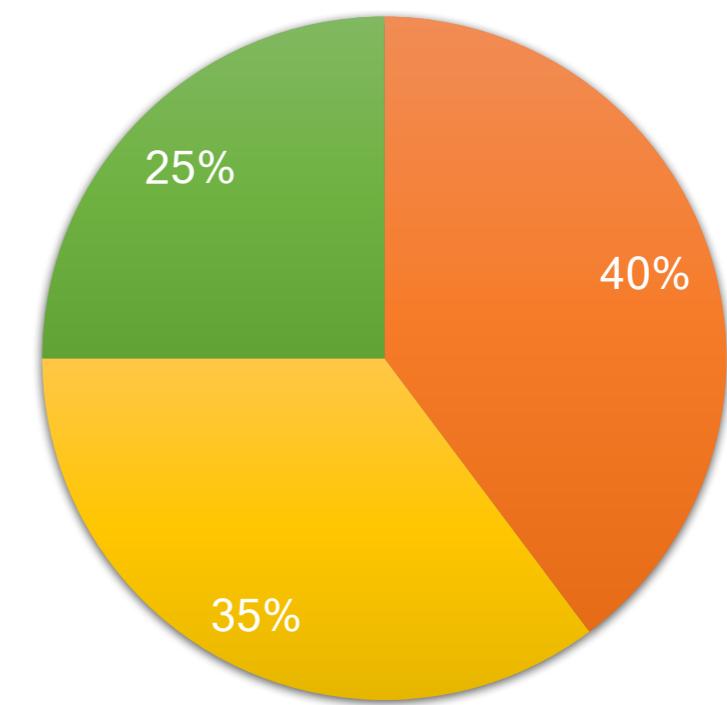
Affiliation



Years of CFD Experience



SU2 Familiarity

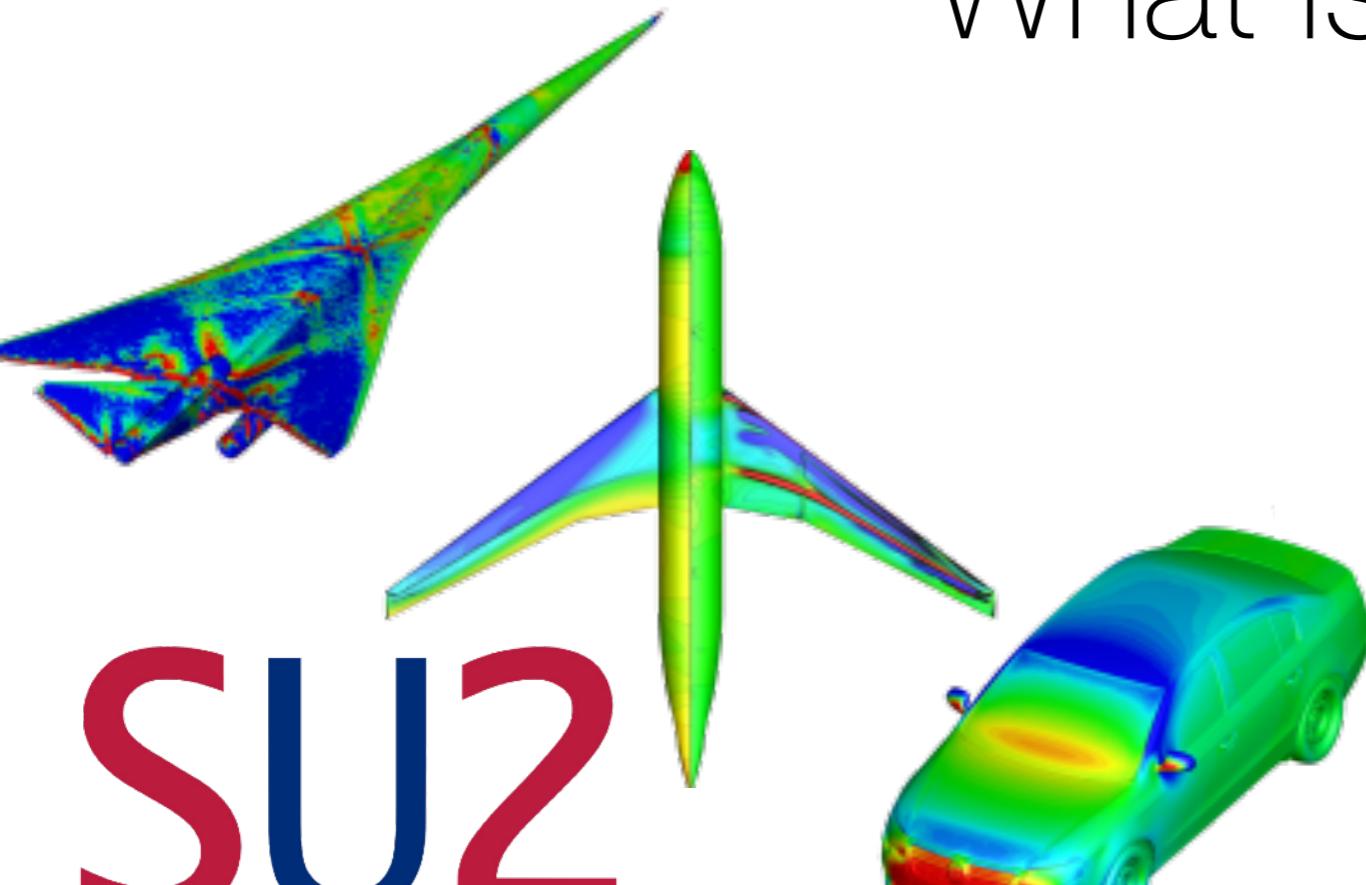


Academia	34	39%
Industry	22	25%
Government	7	8%
Student	23	26%
Other	2	2%

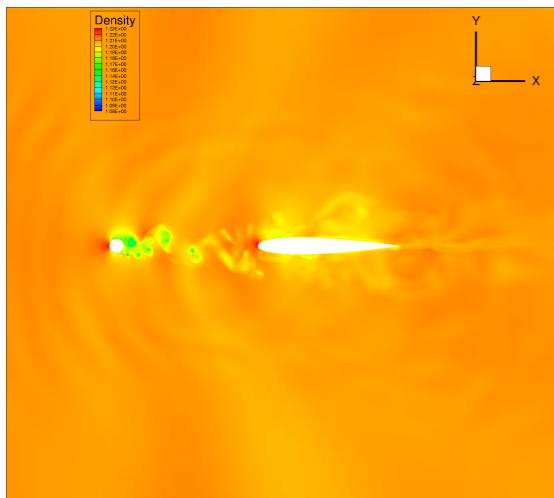
< 1 Year	9	10%
1-2 Years	11	12%
2-5 Years	20	23%
5+ Years	48	55%

Developer	35	40%
User	31	35%
Have not used SU2	22	25%

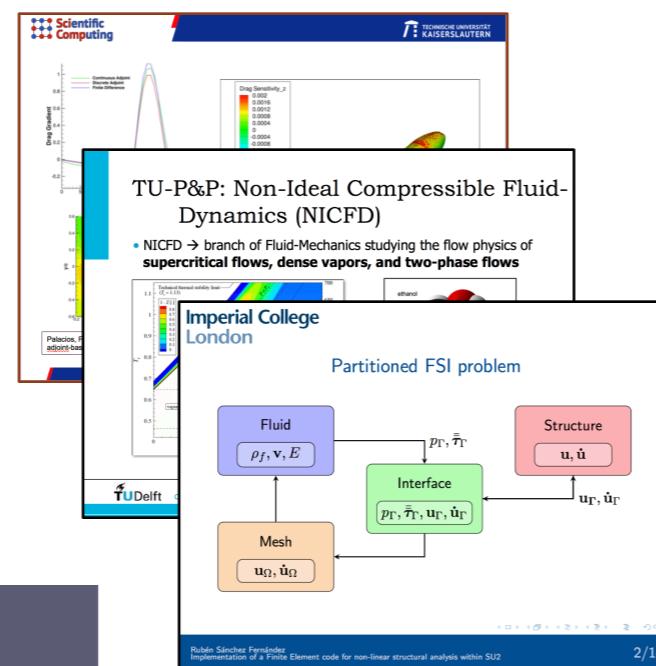
What is **SU2**?



The Open-Source CFD Code



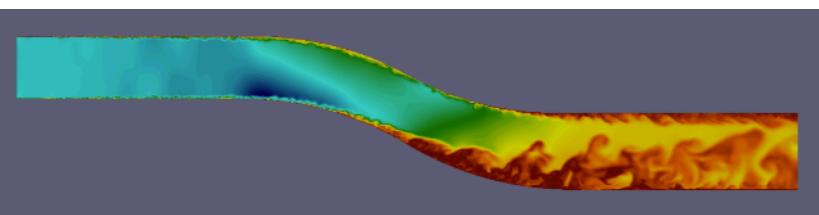
DDES+FWH



- SU2 is an open-source software package for **multi-physics analysis and design**. Gradient availability through adjoints.
- Research platform for CFD, multi-physics, adjoint methods, HPC, and more.
Reusability, readability, portability...
- Software released as **open source** under the LGPL 2.1 license. Available **freely** on GitHub.
- C++/MPI core with a Python layer for automation (~250k lines of code, **HPC-ready**).
- Initial v1.0 release in Jan 2012, v.0 released Feb 2018.

<https://github.com/su2code/SU2>

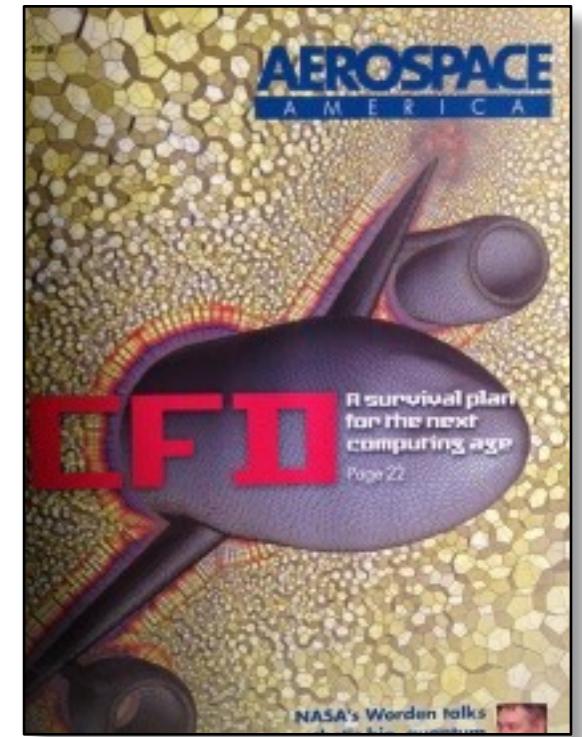
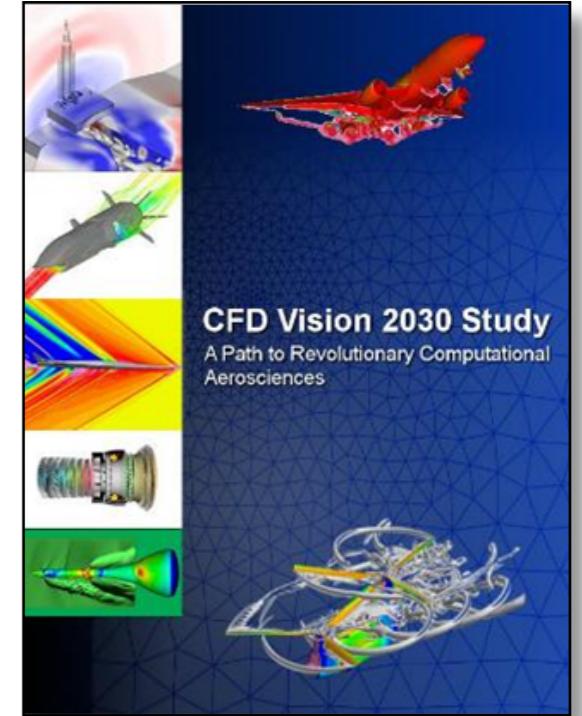
<https://su2code.github.io>



DG-FEM Higher-order Solver

SU2 and the NASA CFD Vision 2030 Study

- Emphasis on physics-based, predictive modeling
Transition, turbulence, separation, unsteady/time-accurate, chemically-reacting flows, radiation, heat transfer, acoustics and constitutive models
- Management of errors and uncertainties
Quantification of errors and uncertainties arising from physical models, mesh and discretization, and natural variability
- Automation in all steps of the analysis process
Geometry creation, meshing, large databases of simulation results, extraction and understanding of the vast amounts of information
- Harness exascale HPC architectures
Multiple memory hierarchies, latencies, bandwidths, programming paradigms and runtime environments, etc.
- Seamless integration with multi-disciplinary analyses and optimizations
High fidelity CFD tools, interfaces, coupling approaches, the science of integration, etc.



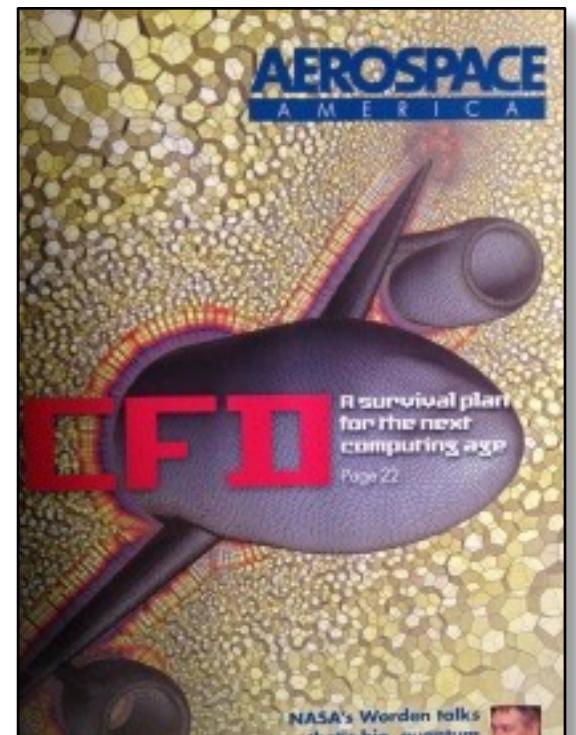
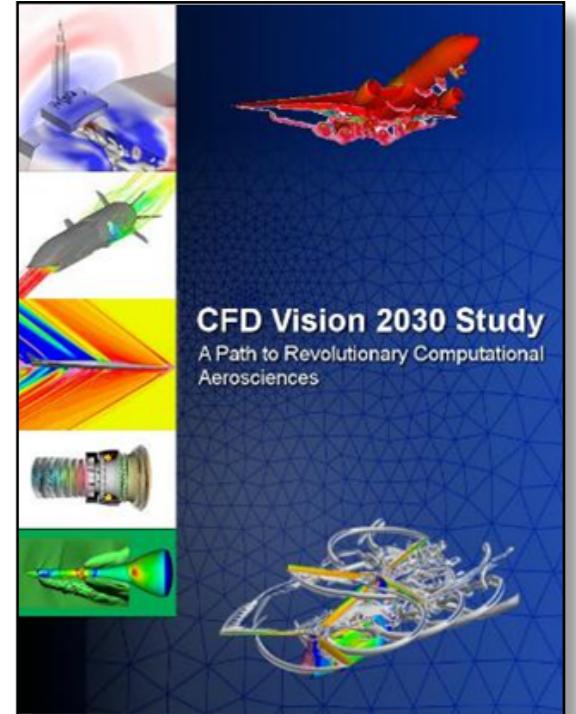
Slotnik, et al., "CFD Vision 2030 Study: A Path to Revolutionary Computational Aerosciences," NASA/CR-2014-218178, 2014



SU2 and the NASA CFD Vision 2030 Study

- **Emphasis on physics-based, predictive modeling**
Transition, turbulence, separation, unsteady/time-accurate, chemically-reacting flows, radiation, heat transfer, acoustics and constitutive models
- **Management of errors and uncertainties**
Quantification of errors and **uncertainties arising from physical models**, mesh and discretization, and natural variability
- **Automation in all steps of the analysis process**
Geometry creation, **meshing**, large databases of simulation results, extraction and understanding of the vast amounts of information
- **Harness exascale HPC architectures**
Multiple memory hierarchies, latencies, bandwidths, programming paradigms and runtime environments, etc.
- **Seamless integration with multi-disciplinary analyses and optimizations**
High fidelity CFD tools, **interfaces**, **coupling approaches**, the science of integration, etc.

Slotnik, et al., "CFD Vision 2030 Study: A Path to Revolutionary Computational Aerosciences,"
NASA/CR-2014-218178, 2014



A Global Development Team...



UNIVERSITY OF TWENTE.

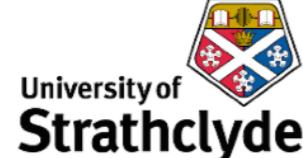


Imperial College
London



SU2

BOSCH

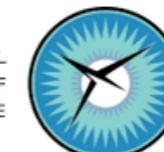


POLITECNICO
MILANO 1863

AIRBUS



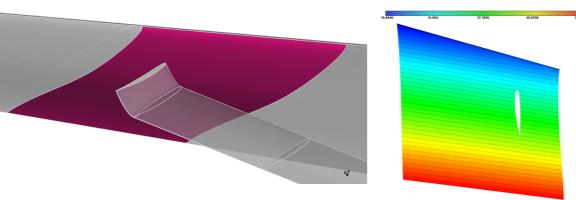
NATIONAL
INSTITUTE OF
AEROSPACE



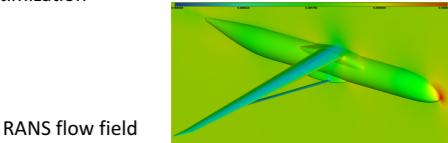
And many others...

Many Exciting News...

Strut-Braced Wing Design



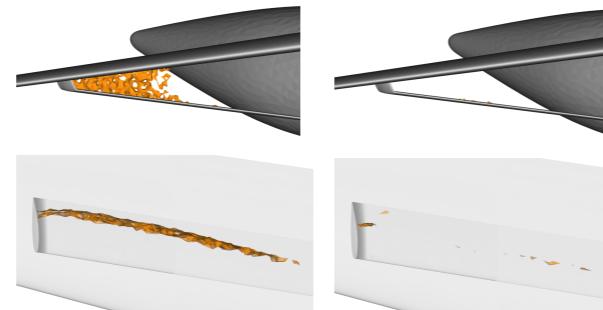
Parametrized transpiration boundary condition used for flow control optimization



RANS flow field

AIRBUS + SU2
The Open-Source CFD Code

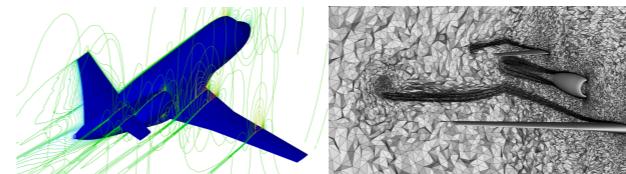
- Strut-Braced Wing aircraft: open model for the community
- Objective: Minimize shock wave drag and separation in strut-wing junction
 - Find candidate flow control technologies and optimization strategies
- Two approaches using SU2:
 - Flow control optimization (transpiration BC)
 - Wing and strut shape optimization



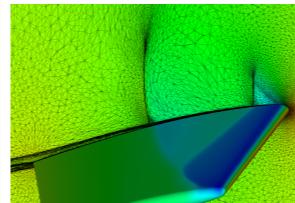
Wave flag : baseline (left) and flow control optimization (right)

Mesh adaptation with the AMG library

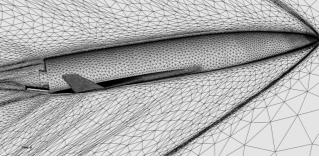
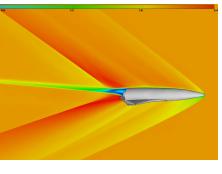
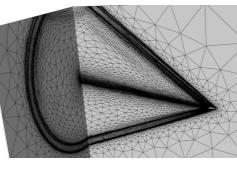
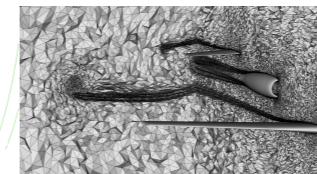
Inria
INVENTORS FOR THE DIGITAL WORLD



Adapted Dassault Falcon (Euler)

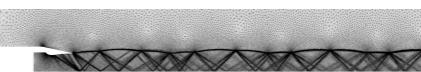


Adapted M6 wing (RANS with adapted boundary layer)



NASA flyer RANS adaptation with frozen boundary layer

AMG + SU2
The Open-Source CFD Code

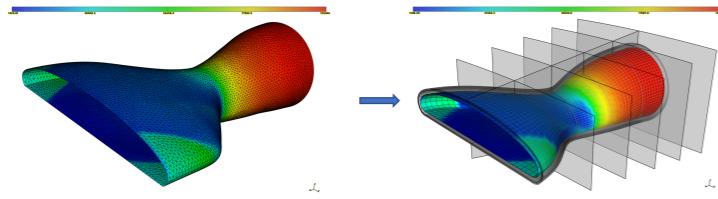


2D axisymmetric nozzle adaptation (DARPA)

DARPA EQUIPS – UQ and DUU

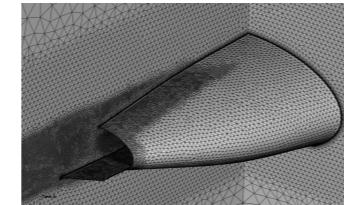
SEQUOIA team: Scalable Environment for Quantification of Uncertainty and Optimization in Industrial Applications

- SU2 :
 - Used in high-level UQ methods for robust and reliability-based design.
 - Complex aero-thermal-structural problems with an external structural/thermal solver AERO-S (FRG).
 - Design Under Uncertainty (DUU): robust and reliability-based design



- CFD mesh / pressure
- Interpolated pressure onto the structural / thermal mesh

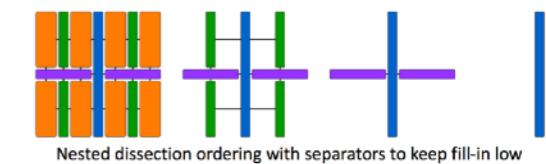
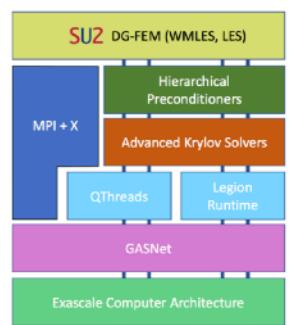
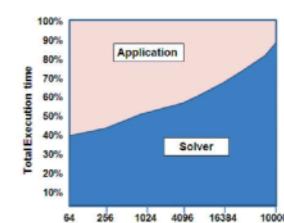
DARPA + SU2
The Open-Source CFD Code



Scalable hierarchical CFD solvers for future exascale architectures

NASA + **SU2**
The Open-Source CFD Code

- Attempting to resolve scalability bottlenecks in large linear system solutions on modern architectures
- Preconditioners based on low-rank compression and hierarchical matrices
- Pipelined s-step communication hiding and communication reducing strategies for iterative Krylov solvers
- Solver prototypes in Qthreads and Legion/Regent
- Demonstrate in SU2 DG-FEM solver

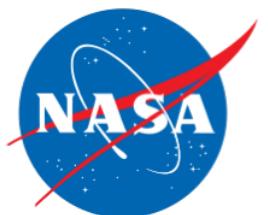


And More News...

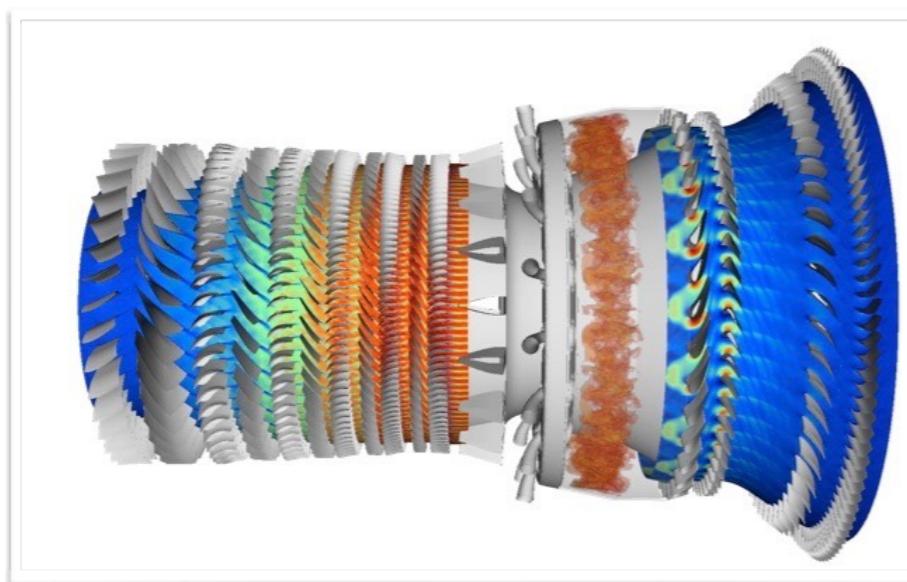
- Continued discussions with members of the industry
- Discussions with LLNL for algebraic multigrid solver / preconditioner
- Discussions with NASA for T-Infinity framework participation
- Conversations with NVIDIA for GPU implementations
- Continued efforts with Pointwise and Tecplot (SZL=Sub-Zone Load on Demand)
- Starting collaboration with Ennova
- Final preparations for SU2 Foundation



**ENNNOVA
TECHNOLOGIES**



The SU2 Timeline



SUmb solver
developed
@ ADL

June 2008
Francisco Palacios
completes PhD with
Juan Alonso
on committee



Jan 2011
Francisco joins
ADL @ Stanford

2003-2008

2009

2010

2011

Summer/Fall 2009
Francisco spends
3 months at Stanford

2010
Work on
CADES (predecessor
to SU2) begins

Summer/Fall
Preparations for
releasing SU2 as
open source

“We must think big... on Jan 20th everybody in the aeronautical community must know that there is a new player in the CFD open-source community.”

- Dr. Francisco Palacios, January 9 2012

SU² Pre-Release Workshop

Presented by Thomas D. Economon
Hosted by the SU² Development Team

Aerospace Design Lab, Stanford University, Stanford, CA 94305, U.S.A.

January 17, 2012

STANFORD UNIVERSITY
Unstructured Code

Jan 17
Pre-release
Workshop



STANFORD | SU²

Stanford University Unstructured

SU²
The New Open Source CFD Code

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

Visualizations About the Code Cite Us

Information Latest News Follow Us

SU² website tops 40,000 visits Mar 6, 2013 SU website tops 30,000 visits Jan 15, 2013 SU version 2.0 workshop presentation [PDF] Jan 8, 2013 AM in Stanford University, 21 Jun SU 2.0.5 (newer version) is now

Tweets Follow @su2code

SU² @su2code Stan, the main generator by Laromma Engineering Dynamics now supports SU2 mesh format [laromma.com/review.html](#) Expand



http://su2.stanford.edu

About SU²

SU² is a cutting-edge, flexible, open-source tool that can be used for:

- High-fidelity analysis
- Adjoint-based design
- Multi-physics simulations
- Adaptive, goal-oriented mesh refinement

Documentation and a full description of current and upcoming features are available on the SU² website: <http://su2.stanford.edu>

Email the development team: susquared-dev@lists.stanford.edu

STANFORD AERONAUTICS & ASTRONAUTICS
aerospacedesignlab

SU² is under active development by the Aerospace Design Laboratory at Stanford University. Visit the AOL at: <http://adl.stanford.edu>

LELAND STANFORD JUNIOR UNIVERSITY
1891

SU²
STANFORD UNIVERSITY
Unstructured Code

<http://su2.stanford.edu>

STANFORD UNIVERSITY UNSTRUCTURED CODE (SU²) RELEASED TODAY, THURSDAY JANUARY 19, 2012

The First Release of The SU² Open-Source Computational Fluid Dynamics (CFD) Analysis and Optimization Suite is Out Today

Jan 19
SU2 v1.0
SU2 is born!

Winter

2012

Spring

Jun 25
SU2 v1.1

Summer

Sep 25
First tweet
@su2code

Oct 31
[su2.stanford.edu](#) update

SU² SU2
@su2code

Check out [su2.stanford.edu](#) for an open source computational design and analysis tool!

6:59 PM - 25 Sep 2012

Reply to @su2code

Fall

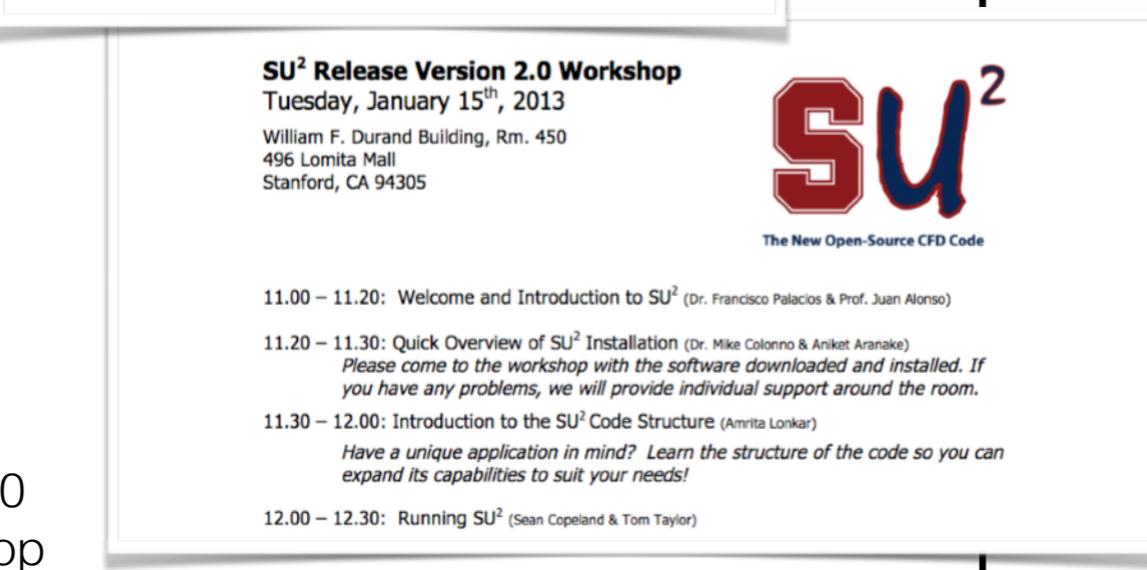
Stanford University Unstructured (SU²): An open-source integrated computational environment for multi-physics simulation and design.

Francisco Palacios*, Michael R. Colombo*,
 Aniket C. Aranake† Alejandro Campos† Sean R. Copeland† Thomas D. Economou†,
 Amrita K. Lonkar† Trent W. Lukaczyk† Thomas W. R. Taylor†,
 and Juan J. Alonso†
Stanford University, Stanford, CA 94305, U.S.A.

Jan 7
 AIAA SciTech
 Presentation



Jan 8
 SU2 v2.0,
 CFD Online
 Forum Open



Jan 15
 SU2 v2.0
 Workshop

Winter

2013



May 17 & 25
 SU2's first two PhDs

openMDAO and SU² joint Workshop
 Sept 30th – Oct 1st, 2013
 William F. Durand Building, Rm. 450
 496 Lomita Mall, Stanford, CA 94305

First day - Basic topics

- 10.00 – 10.15: Welcome and introduction to the Workshop.
- 10.15 – 10.45: Overview of OpenMDAO and installation.
- 10.45 – 11.30: Running OpenMDAO and working with Plugins. *Quick start tutorial.*
- 11.30 – 11.45: Short break.
- 11.45 – 12.15: Overview of SU² and installation.
- 12.15 – 13.00: Running SU². *Quick start tutorial.*
- 13.00 – 13.30: Break (food provided)
- 13.30 – 14.00: Brainstorming for ideas for possible projects.
- 14.00 – 14.45: Hack-a-thon. Work side-by-side writing OpenMDAO/SU² applications.
- 14.45 – 17.00: Adjourn first day.

Second day - Advanced topics

- 9.00 – 9.15: Welcome to the second day.
- 9.15 – 10.45: Advanced topics in SU².
 - Unsteady RANS simulation. SU² has multitude of capabilities for performing high-fidelity analysis of complex geometries. Learn about them here.
 - Design and Optimization Using SU². Learn why SU² is uniquely suited for performing design and optimization of complex aerospace systems.
- 10.45 – 11.00: Short break.
- 11.00 – 12.30: Advanced topics in OpenMDAO:
 - Greater modeling flexibility with automatic coupled derivatives in OpenMDAO.
 - Building complex MDAO methods (e.g. Efficient Global Optimization, StackMC) with OpenMDAO Drivers, Workflows, and MetaModels.
- 12.30 – 13.00: Break (food provided)
- 13.00 – 15.45: Hack-a-thon. Work side-by-side writing OpenMDAO/SU² applications.
- 15.45 – 16.00: Adjourn second day.

Thanks for attending, and note that all stated times are Pacific Time (PDT). Please RSVP by registering at the SU² home-page (<http://su2.stanford.edu>).

You can find more information about the codes in:

- OpenMDAO home-page: <http://openmdao.org>
- SU² home-page: <http://su2.stanford.edu>

Please, come to the workshop with the software downloaded and installed (<https://github.com/OpenMDAO>, and <https://github.com/su2code>). If you have any problems, we will provide individual support around the room.



Aug 10
 SU2 on GitHub



Sep 30
 OpenMDAO / SU2
 Joint Workshop

Summer

Fall



Jan 15
SU2 v3.0
SU2_EDU v1.0



Apr 14
SU2 v3.1

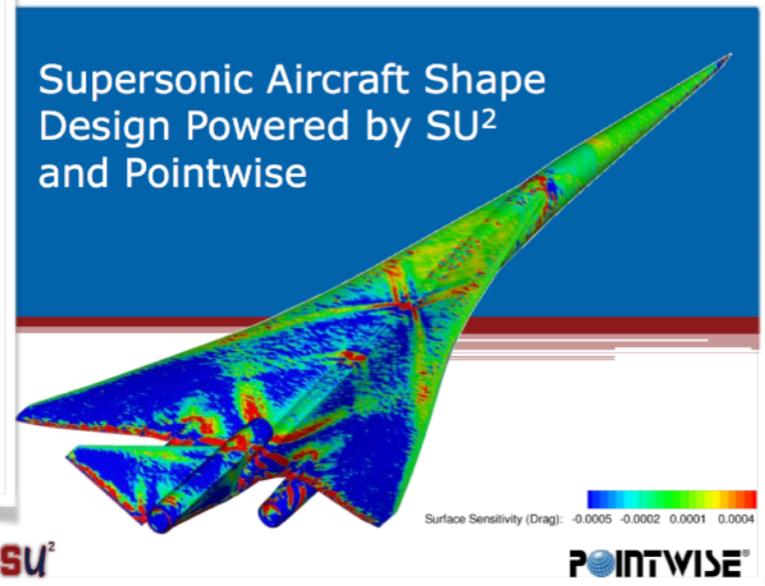
Apr 29
Pointwise-SU2
Webinar



The Open-Source CFD Code



May 7
Intel Parallel
Comp. Center



Spring

2014

Jul 29 - New Logo

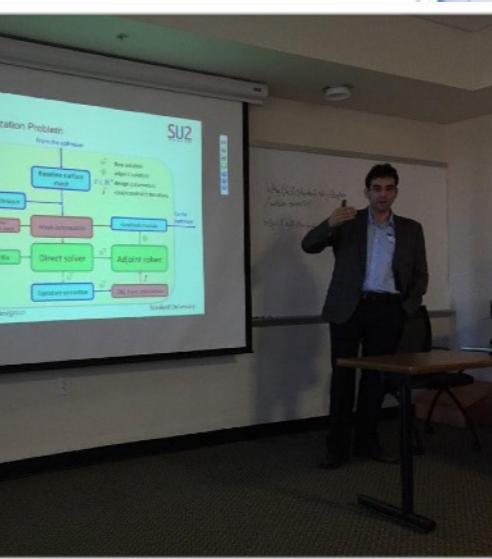


Jul 31
TU Delft & Polimi
Visit Stanford



Jun 17
SU2 v3.2

Sep 16
Dev
Email List



Pointwise® and SU2 Joint Workshop

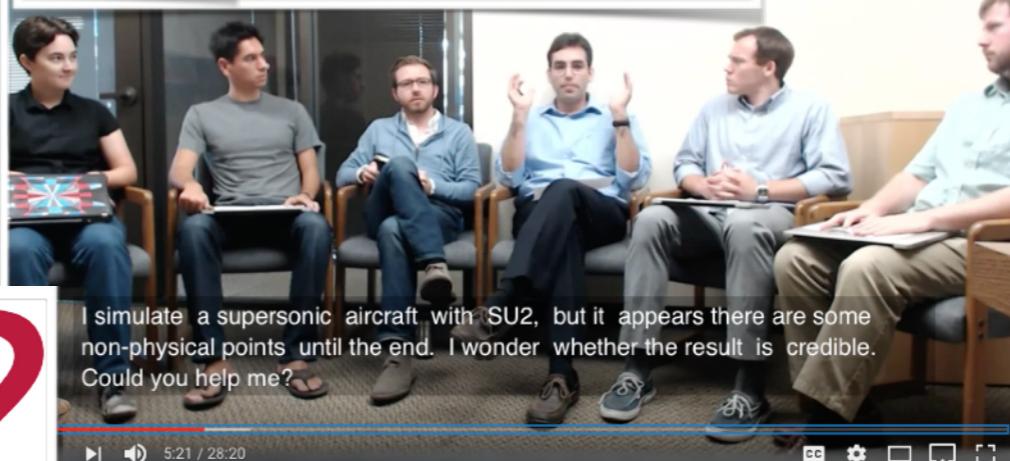
Sept 29th – Sept 30th, 2014
William F. Durand Building, Rm. 450
496 Lomita Mall, Stanford, CA 94305

First day - Basic topics

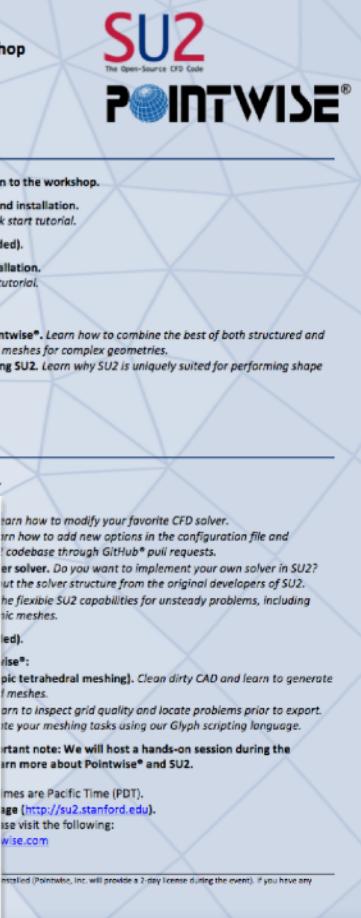
- 10.00 – 10.15: Welcome and introduction to the workshop.
- 10.15 – 10.45: Overview of Pointwise® and installation.
- 10.45 – 11.30: Running Pointwise®. Quick start tutorial.
- 11.30 – 11.45: Short break (coffee provided).
- 11.45 – 12.15: Overview of SU2 and installation.
- 12.15 – 13.00: Running SU2. Quick start tutorial.
- 13.00 – 13.30: Break (food provided)
- 13.30 – 15.00: Hybrid meshing using Pointwise®. Learn how to combine the best of both structured and unstructured meshing to generate hybrid meshes for complex geometries.
- 15.00 – 16.30: Optimal Shape Design using SU2. Learn why SU2 is uniquely suited for performing shape design of complex aerospace systems.
- 16.30 – 17.00: Adjourn first day.

Second day - Advanced topics

9.00 – 9.15: Welcome to the second day.



I simulate a supersonic aircraft with SU2, but it appears there are some non-physical points until the end. I wonder whether the result is credible. Could you help me?



Sep 29
Pointwise-SU2
Joint Workshop

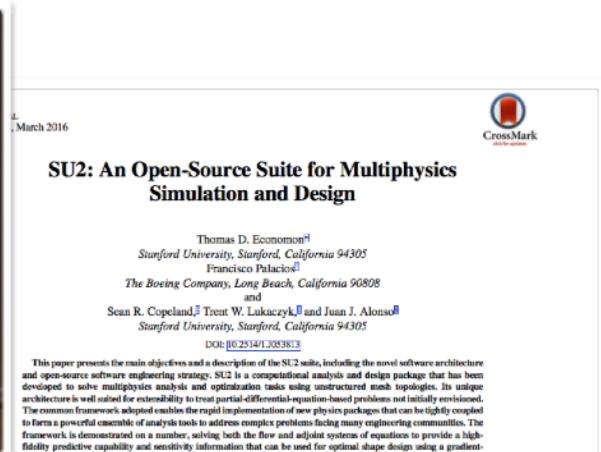
Sep 24
“This Week in SU2”
Youtube Season 1
Premiere

Winter

Spring

Summer

Fall



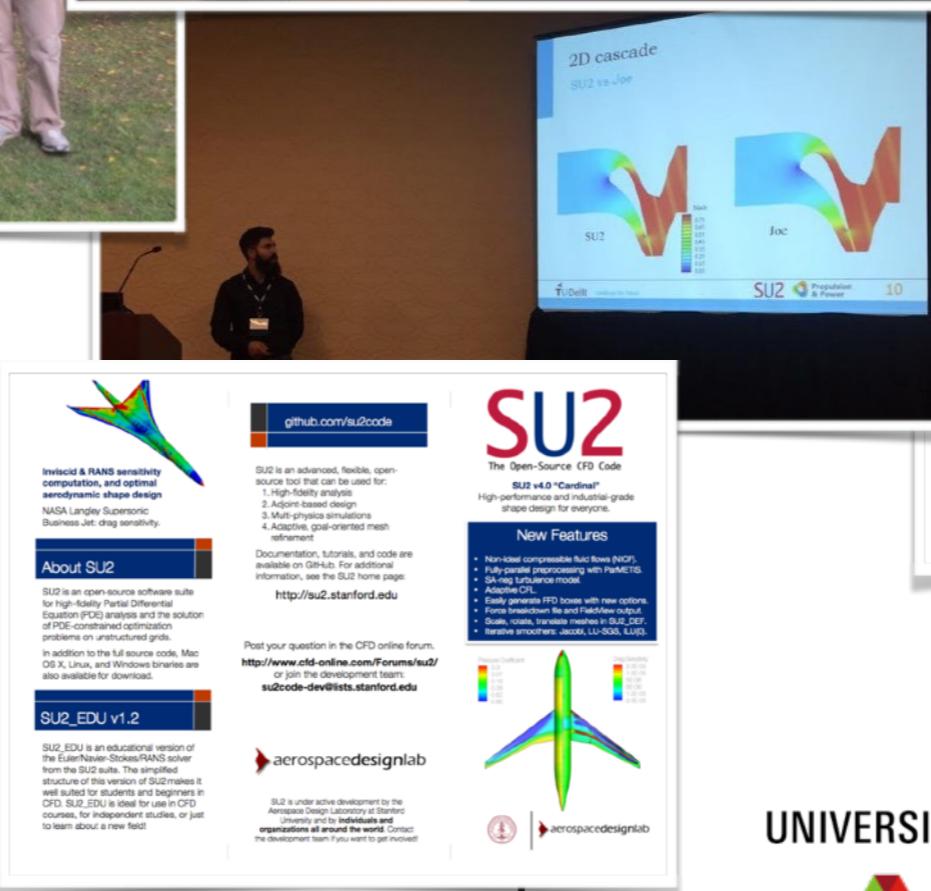
Mar 14 Francisco's farewell from Stanford

Wednesday, March 18

MS302 PDE-constrained Optimization using the Open-source Code SU2

2:00 PM - 3:40 PM
Room: 151 AB

Most established codes for PDE-constrained optimization are proprietary, unavailable, or prohibitively expensive for many users. The SU2 code is freely available as open-source and features a complete computational analysis framework for multidisciplinary design in applications such as, but not limited to, aerospace technology. This minisymposium will cover up-to-date topics within the SU2 framework related to its continuous and discrete adjoint capabilities, the application to large-scale aerodynamic design, and the utilization of many-core architectures. Each of the topics covered involve the combination of multiple research areas of interest to the CS&E community.



Nomenclature	
f	force vector on the surface
J	identity matrix
\bar{J}	cost function defined as integral over S
j	scalar function defined at each point on S
k	turbulent kinetic energy
$\mathcal{N}(i)$	set of neighboring nodes of node i
n	unit normal vector
P	shear-stress transport turbulent kinetic energy production term
Pr_d	dynamic Prandtl number
Pr_t	turbulent Prandtl number
p	state pressure
Q	vector of source terms
q	generic density source term
q_{α}	generic density source term
q_m	generic momentum source term
R	gas constant
$\mathcal{R}(U)$	system of governing flow equations
Re	Reynolds number
\mathcal{R}_n	system of governing equation residual at node i
S	far-field domain boundary
S_{wall}	Spalart-Allmaras turbulence production term
T	temperature
t	time variable
U	vector of conservative variables
W	vector of characteristic variables
W_{far}	far-field characteristic variables
Γ	flow domain boundary
Γ_{far}	far-field domain boundary
γ	ratio of specific heats, equal to 1.4 for air
ΔS_{ij}	interface area between nodes i and j
$\delta(\mathbf{r})$	first variation of a quantity
$\delta_{ij}(\mathbf{r})$	second gradient tensor at a surface point, $\mathbf{n}_S \cdot \nabla(\cdot)$
λ_{dyn}	laminar dynamic viscosity
μ_{tot}	turbulent eddy viscosity
μ_{tot}^2	total viscosity as a sum of dynamic and turbulent components, $\mu_{\text{dyn}} + \mu_{\text{tot}}$
κ^{eff}	effective thermal conductivity: $(\kappa_{\text{dyn}}/Pr_d) + (\kappa_{\text{tot}}/Pr_t)$
v	flow velocity vector
ρ	flow density
τ	pseudotime

828

December 29
SU2 in the
AIAA Journal

Mar 18
SIAM CSE
Mini



March
TU Kaiserslautern
Visits Stanford

Winter

2015

Spring

Jun 23
SU2 v4.0@ AIAA
AVIATION
Travis CI

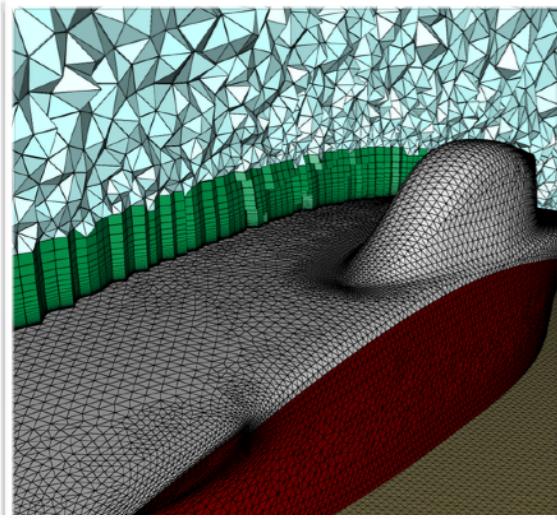
Argonne
NATIONAL LABORATORY
August 6
ALCF Theta
ESP Selection

Imperial College
London

Aug - Sept
Imperial College
Visits Stanford

Summer

Fall



SU2

The Open-Source CFD Code

Continuous or and Discrete.

The open-source SU2 package for CFD analysis and design serves not only as a useable example to computational scientists, but also as a common baseline for future development by the entire community. The current open-source model has enabled the leading experts across many technical areas, anywhere in the world, to work together in creating new capabilities that would not have materialized in the absence of collaboration. Today, we demonstrate this once again with the release of SU2 version 4.1 "Cardinal."

[Download SU2 v4.1](#)

Through collaboration with the SciComp Team at TU Kaiserslautern, we are proud to introduce the support of Algorithmic Differentiation (AD). Based on C++ interfaces, this enables exact derivative computations throughout implementation uses the recently released open-source library, [OpenAD](#), to compute derivatives of all occurring operations and to evaluate the final gradients. C++ features, like static polymorphism and expression templates, combined with advanced AD methods (preaccumulation, externally differentiated communication) result in a low memory footprint and fast evaluations.

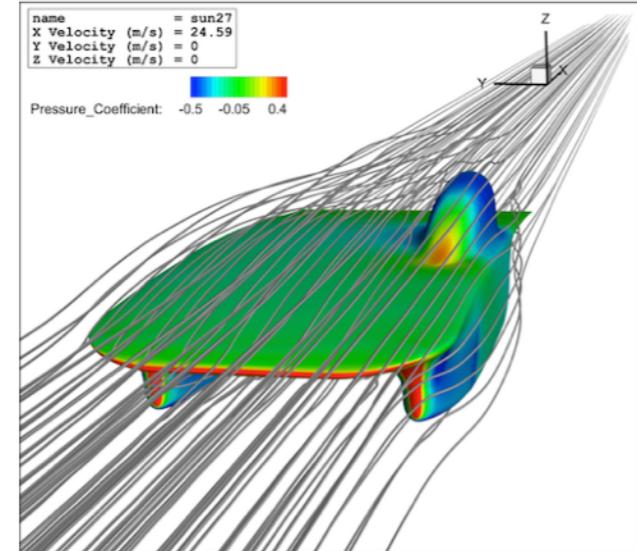
Jan 7
SU2 v4.1



Feb 29
NASA LBFD
Announced

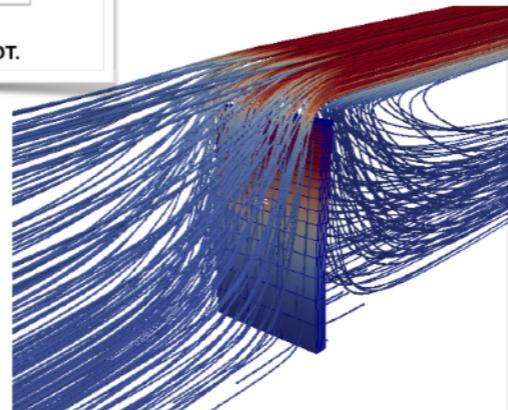
Winter

The Stanford Solar Car Project's Race for Aerodynamic Efficiency



You are invited to a free webinar on Tue, Apr 5, 2016 8:00 AM - 9:00 AM PDT.

Apr 5
Pointwise,
Tecplot,
SU Solar Car,
SU2 Webinar



The open-source SU2 package for CFD analysis and design was conceived as a platform for multi-physics research. We've been hard at work improving our C++ class architecture to more easily support the addition of new physical models and their coupling at a high-level, and today we are releasing a powerful new example in the form of a fluid-structure interaction (FSI) capability embedded within SU2 version 4.2 "Cardinal."

[Download SU2 v4.2](#)

Jun 15
SU2 v4.2

Spring



SU2

The Open-Source CFD Code

Fluid, meet Structure.

1st Annual SU2 Developers Meeting

Sept 5th, 2016

TU Delft, Aula Conference Center, Commissie Kamer 3

Mekelweg 5, 2628 CC Delft, Netherlands

Meeting Agenda

- 09.00 – 09.15: Welcome & Introduction
- 09.15 – 09.35: SU2: Overview of History, Status, and Future Developments
Prof. Juan J. Alonso & Dr. Thomas D. Economon, Stanford University
- 09.35 – 10.00: NICFD [Non Ideal Compressible Fluid Dynamics] in the SU2 Framework
Prof. Alberto Guardone, Politecnico di Milano (presenter), Profs. Piero Colonna & Matteo Pini, TU Delft
- 10.00 – 10.25: Automatic Differentiation Discrete Adjoints Using SU2
Prof. Nicolas Gauger, TU Kaiserslautern
- 10.25 – 10.35: Coffee Break
- 10.35 – 11.00: Development of a High-Order Discontinuous Galerkin Fluid Solver Within SU2
Prof. Edwin van der Weide, University of Twente
- 11.00 – 11.25: Fluid-Structure Interaction Problems Using Native and External Structural Solvers Coupled to SU2
Prof. Rafael Palacios (presenter) & Mr. Ruben Sanchez, Imperial College, Prof. Vincent Tropron & Mr. David Thomas, Université de Liège
- 11.25 – 11.50: Turbomachinery Simulations Using SU2
Profs. Matteo Pini (presenter) & Piero Colonna, Mr. Salvatore Vitale, Mr. Antonio Rubino, TU Delft Prof. Alberto Guardone, Mr. Giulio Gori Politecnico di Milano
- 11.50 – 12.15: Mesh Adaptation for SU2 with the INRIA AMG Library
Prof. Juan J. Alonso & Dr. Thomas D. Economon, Stanford University
- 12.15 – 12.45: SU2 Development Priorities for the Next Year / Discussion
Prof. Juan J. Alonso (moderator), all attendees

In order to participate (in-person or virtually), please register for the meeting by following the link on the SU2 home page (<http://su2.stanford.edu>). Thanks for your interest and note that all stated times are Central European Summer Time (CEST).

To find more information about SU2 or to get involved, please visit the following pages:

- SU2 on GitHub: <https://github.com/su2code/SU2>
- SU2 Forum on CFD Online: <http://www.cfd-online.com/Forums/su2/>
- Follow SU2 on Twitter: <https://twitter.com/su2code>

Stanford ENGINEERING Aeronautics & Astronautics | TU Delft Aerospace Engineering | Imperial College London | UNIVERSITY OF TWENTE | Argonne National Laboratory | TECHNION Israel Institute of Technology

Université de Liège

Jul / Aug
U of Liege
Visits Stanford

Aug
SU2 v4.3

Sep 5
1st Annual SU2
Developers
Meeting

Fall

2016

Nov 8 (2016)

SU2 Article Becomes Most Read Paper in AIAA Journal

Access provided by STANFORD UNIVERSITY LIBRARIES AIAA ASSOCIATION WEBSITE • VIEW CART (0) • JOIN • LOGIN • INSTITUTION LOGIN

ARC
AEROSPACE RESEARCH CENTRAL

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AIAA Journal

This Journal is devoted to the advancement of the science and technology of aeronautics and aeronautics through the dissemination of original archival research papers disclosing new theoretical developments and/or experimental results. The topics include aerodynamics, aerodynamics, combustion, fundamentals of propulsion, fluid mechanics and reacting flows, fundamental aspects of the aerospace environment, hydrodynamics, lasers and associated phenomena, plasmas, research instrumentation and facilities, structural mechanics and materials, optimization, and thermomechanics and thermochemistry. Papers also are sought which review in an intensive manner the results of recent research developments on any of the topics listed above.

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Current AIAA Masthead

AIAA is transitioning to

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JOURNAL

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Two-equation eddy-viscosity turbulence model for engineering applications Vol. 32, Iss. 8

SU2
The Open-Source CFD Code

SU2 v5.0 Raven
Get wrapped up in it.

In order to participate (in-person or virtually), please register for the meeting by following the link included in the email. Thank you for your interest in SU2. Please make sure to install SU2 and run at least one tutorial prior to the workshop. (See To find more information about SU2 or to get involved, please visit the following pages:

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Stanford | ENGINEERING Aerodynamics & Aerostatics

Jan 19
SU2 v5.0

Winter

2017

<https://su2code.github.io>

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SU2

The Open-Source CFD Code

Analyze. Optimize. Design!

Visualizations About the Code Cite Us

Developers Meeting - View the Agenda

December 18-19, 2017 Stanford University Campus Register Here!

Latest News

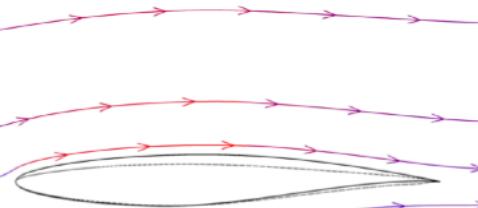
December 18th, 2017 2nd Annual SU2 Developers Meeting hosted at Stanford University, Durand Building, Room 450 December 19th, 2017 Official Release of SU2 v5.0 January 5th, 2016 1st Annual SU2 Developers Meeting hosted at TU Delft January 15th, 2016 Official Release of SU2 v4.2 at Stanford Solar Car team July 5th, 2016 SU2 participates in joint webinar with Pointwise, Tecplot, and the Stanford Solar Car team

Meeting Agenda

0800 – 0825: Welcome & Year in Review, J. Alonso, Stanford, T. Economou, Bosch, F. Palacios, Boeing 0825 – 0850: Upgrades for Parallel Performance and Low Speed Flows with Heat Transfer, T. Economou, Bosch 0850 – 0915: Implementation and Assessment of High-Order Methods in the Framework of SU2, K. Singh, D. Drikakis, I. Kokkinakis, M. Frank, University of Strathclyde A BGK-Kinetic Formulation Including Vibrational and Electronic Energy Modes, A. Mogavero, J. Herrero-Montojo, M. Fossati, University of Strathclyde 0915 – 0940: Current Developments and Applications Related to the Discrete Adjoint Solver in SU2, T. Albring, N. Gauger, et al., TU Kaiserslautern 0940 – 1005: Coffee Break 1005 – 1030: An Overview of DOEs in SU2: Implementation and Recent Results, E. Molina, R. G. A. da Silva, Aeronautical Institute of Technology (ITA-Brazil) 1030 – 1055: Recent Advances in Flow Analysis Capability and Adjoint-based Design for Turbomachinery with SU2, M. Pini, S. Vitale, A. Rubino, L. Azzini, N. Arond, P. Colonna, TU Delft 1055 – 1120: Uncertainty Estimation of Turbulence Model Predictions in SU2, J. Mukhopadhyay, A. Mishra, G. Iaccarino, J. Alonso, Stanford 1120 – 1145: Coffee Break 1145 – 1210: SU2: A Reliable Computational Framework for Non-Ideal Compressible-Fluid Dynamics Applications, G. Gori, Politecnico di Milano, P. M. Congedo, Inria - Bordeaux Sud-Ouest, A. Gardone, Politecnico di Milano 1210 – 1235: Coupled Adjoint-based Sensitivities Using the SU2 Native FSI Solver, R. Sánchez, C. Venkatesan-Crome, R. Palacios, Imperial College 1235 – 1300: Development of a Nodal DG Solver within the SU2 Framework, E. van der Weide, University of Twente, J. Choi, Stanford, D. Mudigere, Intel Labs, P. Urbanczyk, J. Alonso, Stanford

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Summer School on SU2



Lectures and Tutorials on the Open-Source CFD Code SU2 and the Adjoint Approach to Design

Aug 21 – August 25, 2017
Kaiserslautern, Germany

Aug 21
SU2 Summer School
@ Kaiserslautern

Summer

Spring

SU2
The Open-Source CFD Code

Technical Meeting

12/01/2017

1:49:25
SU2 Technical Meeting
137 views • 2 weeks ago

Dec 1
Open Technical Call (YouTube)

SU2
The Open-Source CFD Code

2nd Annual SU2 Developers Meeting
December 18th, 2017 Stanford University, Durand Building, Room 450 December 19th, 2017 Official Release of SU2 v5.0

Meeting Agenda

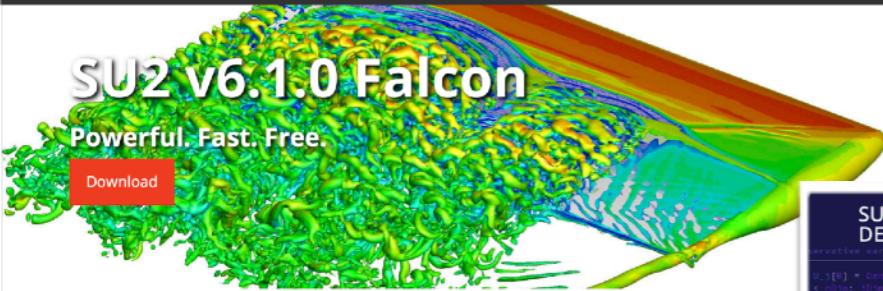
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Stanford TU Delft Imperial College London UNIVERSITY OF TWENTE UNIVERSITY OF MILAN BOSCH

Dec 18
2nd Annual SU2 Dev Meeting

Fall



3rd Annual SU2 Developers Meeting

NEW: [Download the Meeting Agenda!](#)[Meeting Info Page with Venue and Accommodations](#)

September 16-18, 2018

University of Strathclyde, Glasgow, UK

[Register Here!](#)

<https://su2code.github.io> (left)
<https://www.su2devsociety.org> (below)

The SU2 International Developers Society (IDS) is a professional, non-profit association tailor-made to support the diverse group of SU2 developers. It will connect them and provide formal representation inside and outside of the SU2 environment.

We are about to get started, but we need you! Becoming a member and benefiting from the advantages is free of charge.

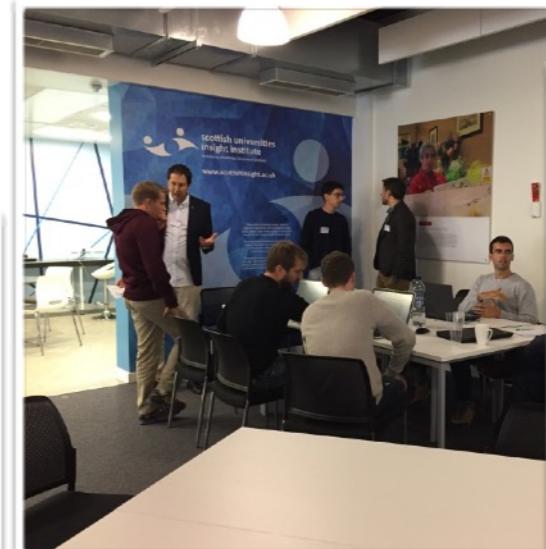
[Become a Member](#) [More information](#)

SU2 v6.1 Falcon

Getting better all the time.

Today, we proudly introduce SU2 v6.1. This release contains a new feature set for incompressible flows with heat transfer, and we're pairing it with a [new set of tutorials](#) to show you how to use it. Like a fine wine, SU2 just keeps improving with age, and this vintage is available for you to enjoy today.

[Download SU2 v6.1](#)



Sept 16
SU2 Hackathon

3rd Annual SU2 Developers Meeting
 September 16th-18th, 2018
 University of Strathclyde, Scottish Universities Insight Institute (SUII)
 Glasgow, Scotland, UK

Meeting Agenda for Sunday September 16th

0900 - 0915: Welcome & Agenda	SU2
0915 - 1045: Introduction to developing in SU2: Covering high level class design, how to modify the code, working with GitHub (branching, PRs, regressions), etc.	The Open-Source CFD Code
1045 - 1615: Hack session: Separate groups working on various problems (lunch and snacks/coffee offered in the room while working)	
1615 - 1700: Wrap-up Presentations: Two-slide presentations on major progress for the day, including discussion	
1730 - open: Social at "The Counting House", 2 St Vincent Place, G1 2DH	

Meeting Agenda for Monday September 17th

0800 - 0830: Welcome & Year in review, <u>T. Economou</u> (Bosch), <u>J.J. Alonso</u> (Stanford)	
0830 - 0900: SU2-NEMO - Thermochemistry and High-Mach aerothermodynamics, <u>M. Fossati</u> (U of Strathclyde), T. Magin, J.B. Scoggins, M. Pini, P. Colonna, R. Sanchez, T. Economou, D. Mayer, N. Beishuizen, C. Garabaz-Gomes, W.T. Meier, J.J. Alonso, T. van der Steelt	
0900 - 0930: Toward optimization for reactive flows in SU2, <u>N. Beishuizen</u> (Bosch), D. Mayer, T. Economou	
0930 - 1000: Conjugate heat transfer problems and computing coupled discrete adjoints using AD, <u>D. Burghardt</u> (TU Kaiserslautern), T. Albring, N. Gauger	
1000 - 1030: Coffee break	
1030 - 1100: Physics-based RANS model-form UQ in SU2, <u>J. Mukhopadhyay</u> (Stanford), A. Mishra, J.J. Alonso, G. Iaccarino	
1100 - 1130: Aeroacoustics prediction and optimization capabilities in SU2, <u>B. Zhou</u> (NIA/NASA-Langley), T. Albring, N. Gauger, C. Ibarro, T. Economou, J.J. Alonso, L. V. Lopes, H. Yoo, S. Peng, L. Davidson	
1130 - 1200: Higher-order SU2: DG-FEM solver and WENO-FV solver with LES/WMLES applications, <u>E. van der Weide</u> (U. of Twente), J.J. Alonso, D. Drikakis, K. Singh, P. Urbaneczik, E. Molina, J.H. Choi	
1200 - 1300: Lunch	
1300 - 1330: Unsteady optimization with SU2: application to turbomachinery design, <u>A. Rubino</u> (TU Delft), M. Pini, N. Anand, P. Colonna	
1330 - 1400: Preliminary results on rotor-fuselage aerodynamics using SU2: status and challenges, <u>M. Morelli</u> (Politecnico di Milano), G. Gori, A. Guardone	
1400 - 1430: Anisotropic mesh adaptation with the INRIA AMG library, <u>A. Loselle</u> (INRIA), V. Menier, B. Munguia, J.J. Alonso	
1430 - 1500: Coffee break	
1500 - 1530: Simulation and adjoint-based design for variable density incompressible flows with heat transfer, <u>T. Economou</u> (Bosch)	
1530 - 1600: Implementation of pressure-based Navier-Stokes for wind energy applications, <u>A. Ravishankar</u> (ECN part of TNO), H. Ozdemir, E. van der Weide	
1600 - 1630: SU2-IDS: International Developers Society, <u>T. Albring</u> , <u>R. Sanchez</u> (TU Kaiserslautern), T. Economou, F. Palacios	
1630 - 1700: Wrap up, <u>J.J. Alonso</u> (Stanford)	

In order to participate (in-person or virtually), please register for the meeting by following the link on the SU2 home page (<https://su2code.github.io>). *Please note that all stated times are British Summer Time (BST). **The presenter author is underlined

Stanford TU Delft Imperial College London UNIVERSITY OF TWENTE BOSCH

Sep 17
3rd Annual
SU2 Dev Meeting

Feb 14
SU2 v6.0
New SU2 Website
SU2 IDS is born!

Winter

2018

Spring

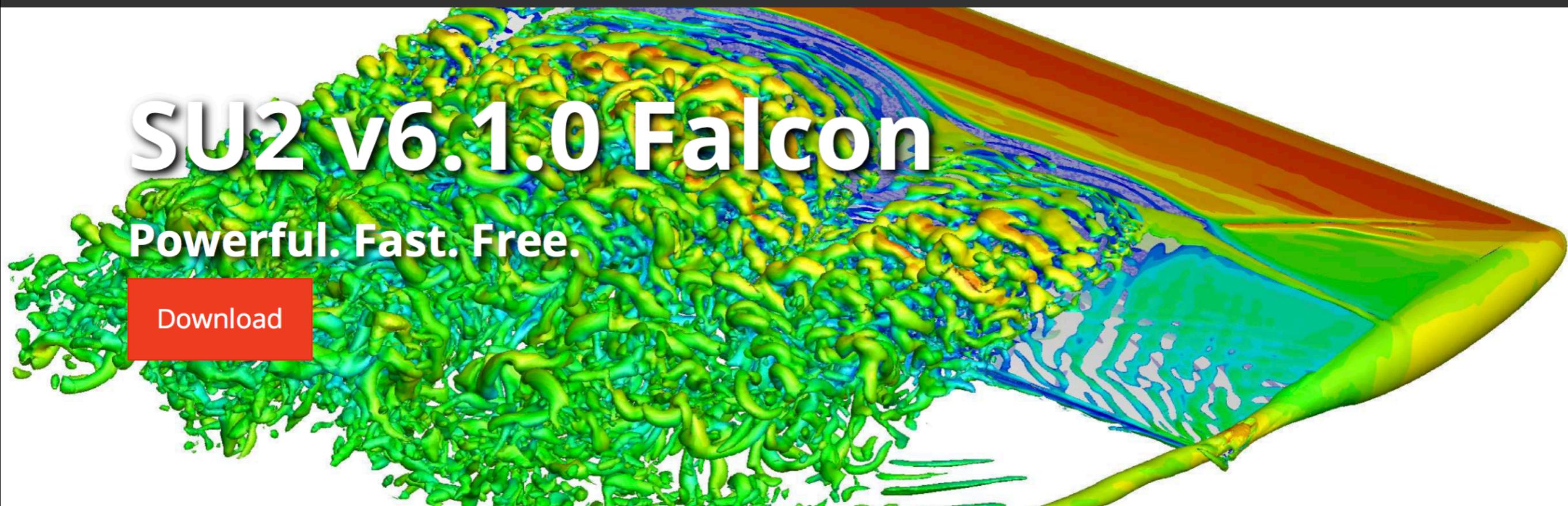
June 22
SU2 v6.1.0

Summer

Fall

SU2 v6.1.0 Falcon

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3rd Annual SU2 Developers Meeting

NEW: Download the Meeting Agenda!

[Meeting Info Page with Venue and Accommodations](#)

September 16-18, 2018

University of Strathclyde, Glasgow, UK

[Register Here!](#)

Major upgrade for <https://su2code.github.io>

```
    U_j[0] = Density_j;
    i < nDim; iDim++) {
        Density_i*Velocity_i[iDim]; U_j[iDim+1] = Density_j*Velocity_j[iDim];
        Density_i*Energy_i; U_j[nDim+1] = Density_j*Energy_j;

    values of the variables ---*/
    Density_i+Density_j);
    (Pressure_i+Pressure_j);
    (Enthalpy_i+Enthalpy_j);
    i < nDim; iDim++)
    ] = 0.5*(Velocity_i[iDim]+Velocity_j[iDim]);
    Energy_i+Energy_j);
```

To connect the two parts of the code, we can use a function or a macro to handle the boundary conditions. This will ensure that the boundary conditions are applied correctly and consistently across both parts of the code.

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Become a Member

More information

New web portal: <https://www.su2devsociety.org>



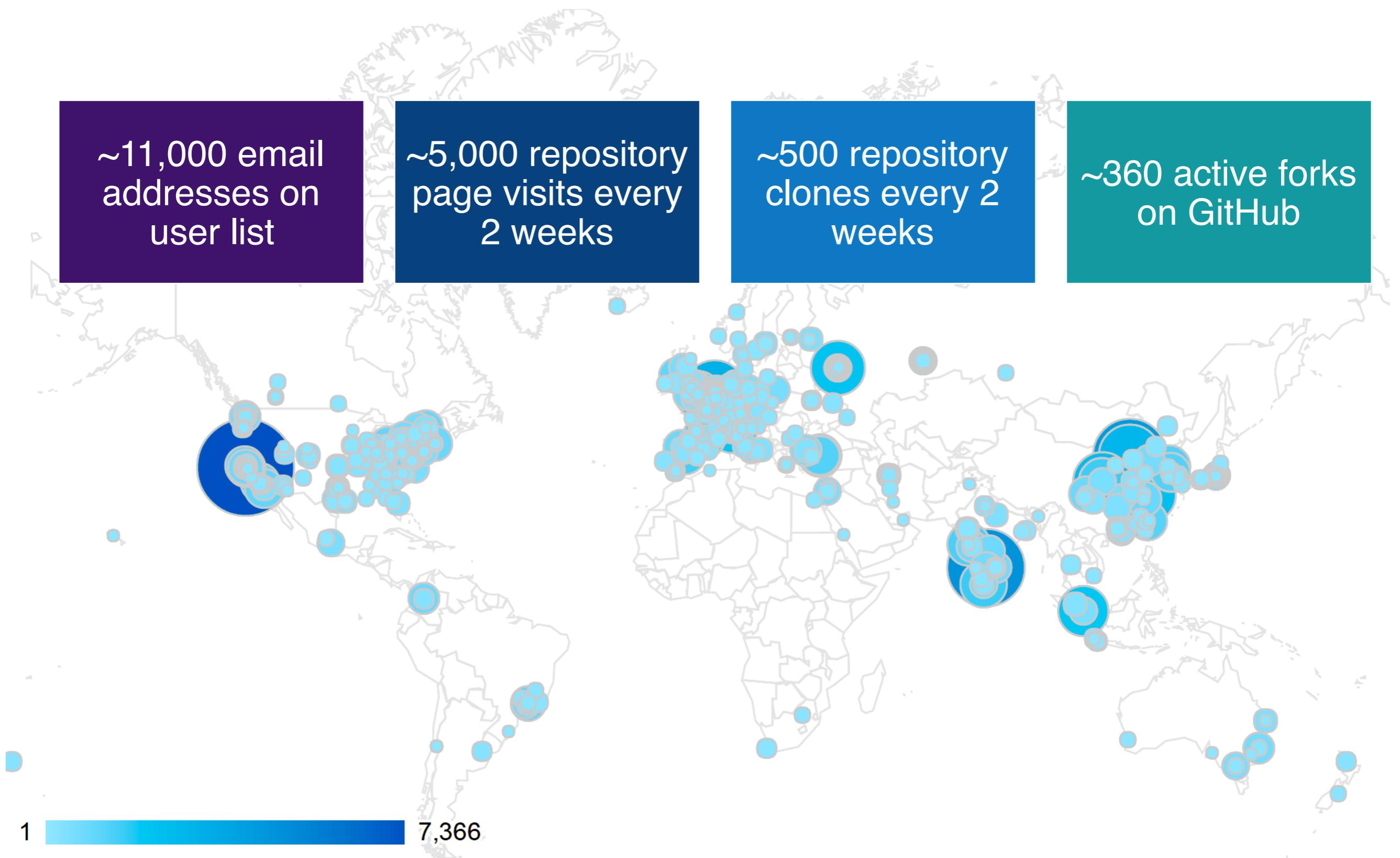
Where are we today? Everywhere.

~11,000 email
addresses on
user list

~5,000 repository
page visits every
2 weeks

~500 repository
clones every 2
weeks

~360 active forks
on GitHub



Map shows web hits at <https://su2code.github.io> by city.

51 Pull
Requests in
2018

455 Commits
to ‘develop’
Branch in 2018

228k Lines of
C/C++ Code
as of v6.1.0

209 Continuous
Regression
Tests

154 Active
Branches in
Repository

362 Active
Forks on
GitHub

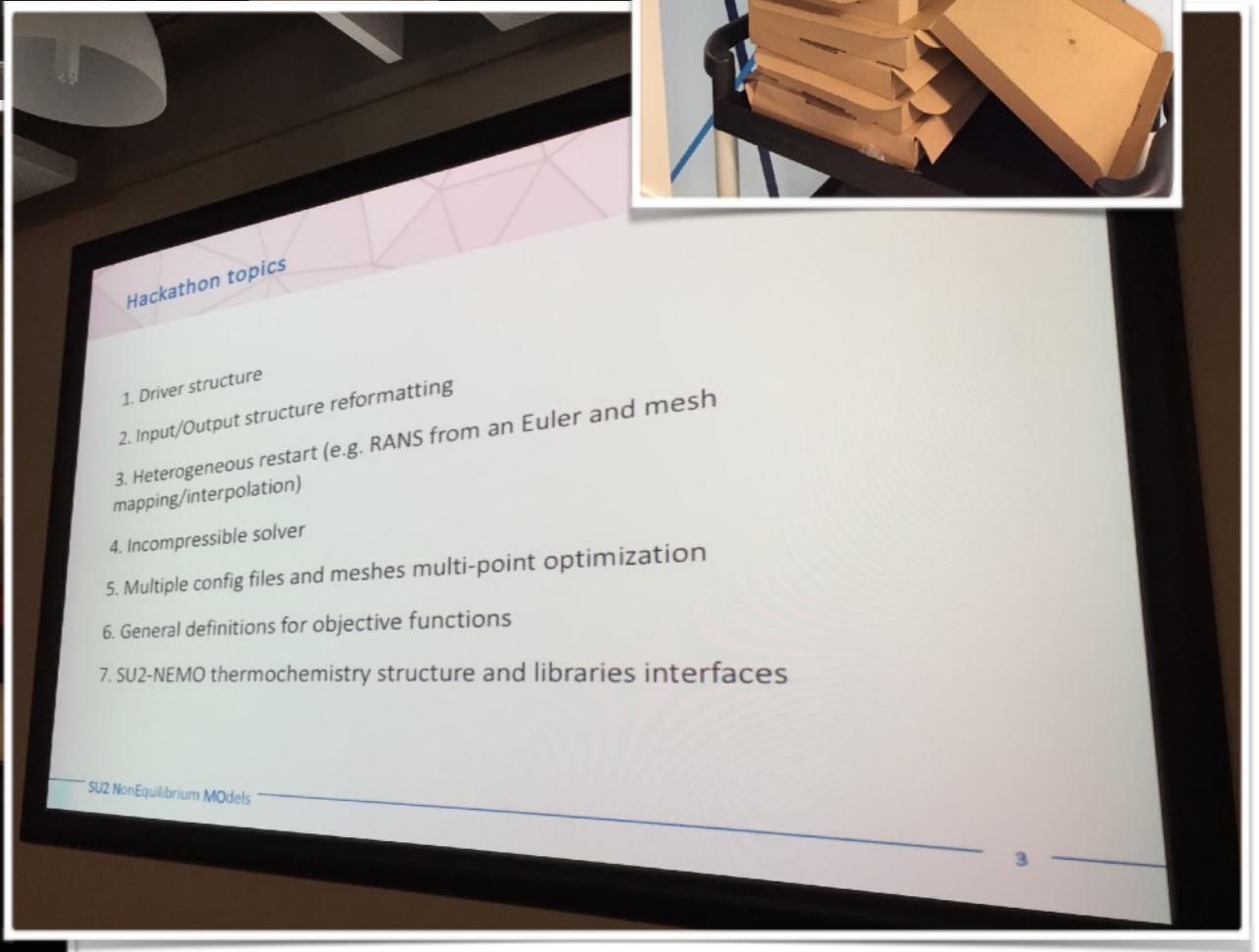
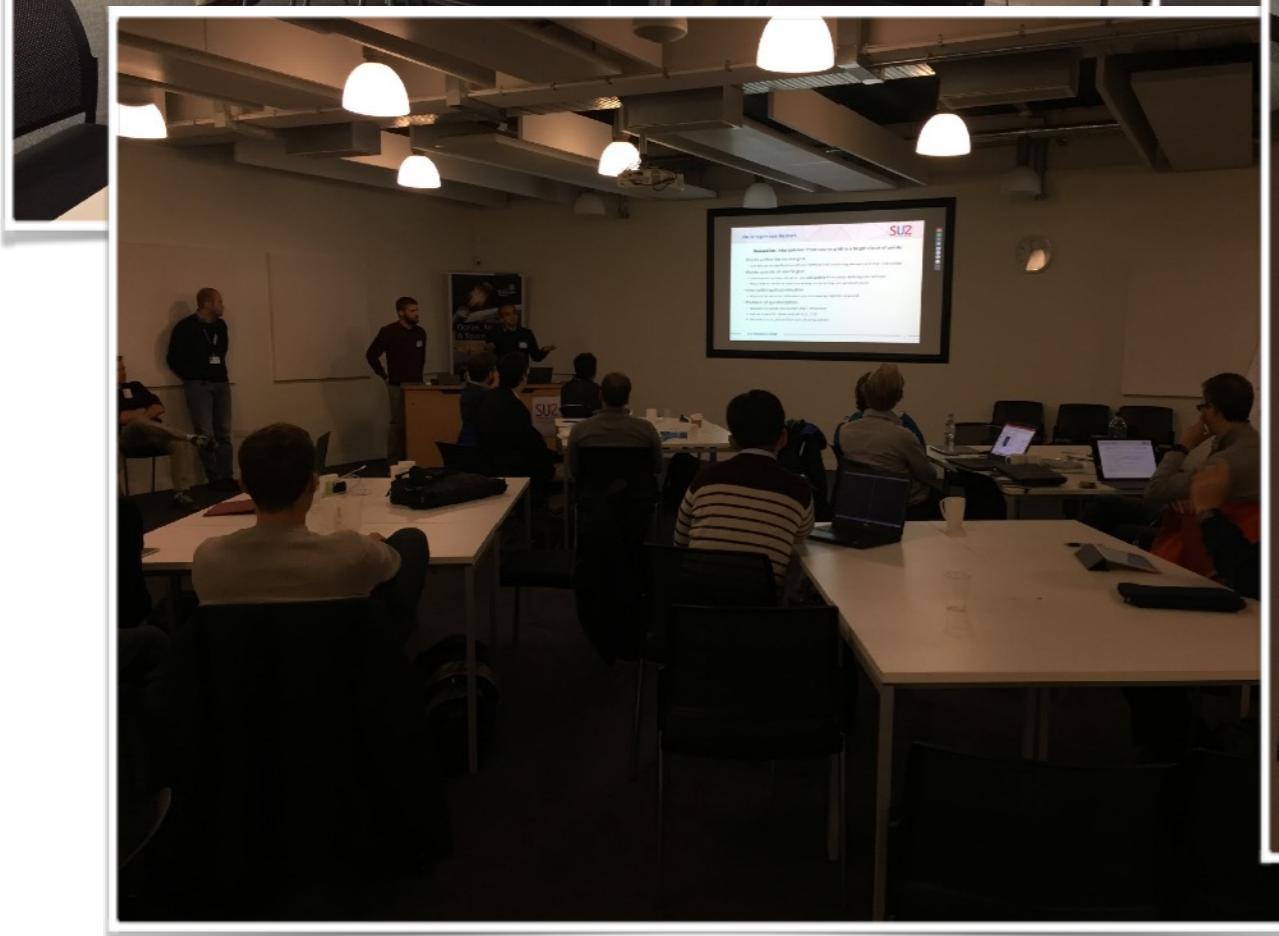
Anyone can be an SU2 Developer.

Git/Branching Development Regressions Pull Request Release

The screenshot shows a GitHub repository page for `su2code/SU2`. A horizontal timeline at the top indicates the stages of development: Git/Branching (red dot), Development (orange dot), Regressions (green dot), Pull Request (blue dot), and Release (purple dot). The main area displays a pull request titled "Py2 and Py3 support #424". The pull request has been merged, as indicated by the "Merged" status and the message "economon merged 89 commits into `su2code:develop` from `netebachant:py2_and_py3_support` 8 days ago". The commit history shows several commits from "economon" and "timalbring", with "timalbring" approving the changes. A note states, "Just tested the branch locally. Everything seems to work fine. We can merge this in next." The pull request also includes a Travis CI status badge showing "1 check passed" and "continuous-integration/travis-ci/pr The Travis CI build passed". A note at the bottom indicates that "petebachant deleted the `petebachant:py2_and_py3_support` branch 7 days ago". On the right side of the page, there is a sidebar with repository statistics: 153 forks, 314 stars, and 320 contributors. A red circle highlights the "Fork" button in the top navigation bar. To the right of the page, a text box encourages users to learn how to get started by checking out developer tutorial slides from the 2018 SU2 Hackathon.

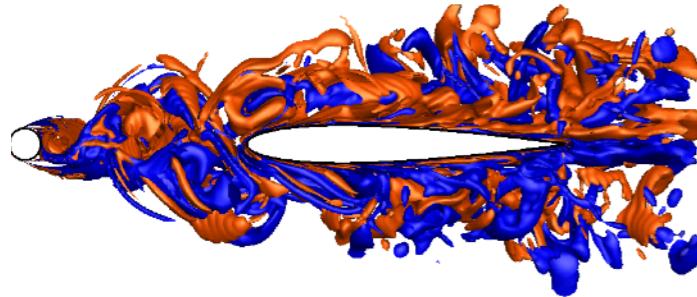
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Hackers Welcome Here.

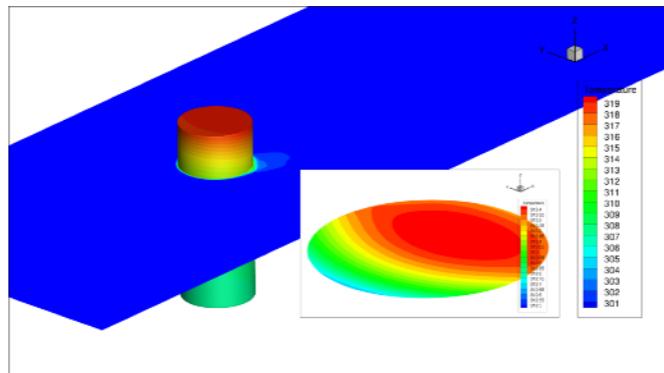


Pictures from our official SU2 Hackathon on Sunday September 16, 2018.

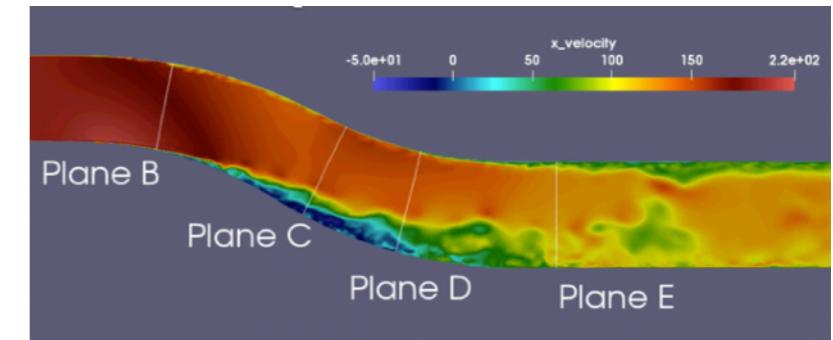
Some Topics for Today



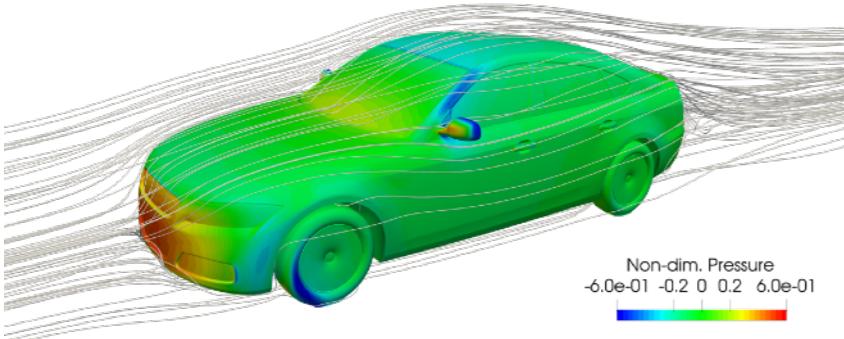
DDES + FWH



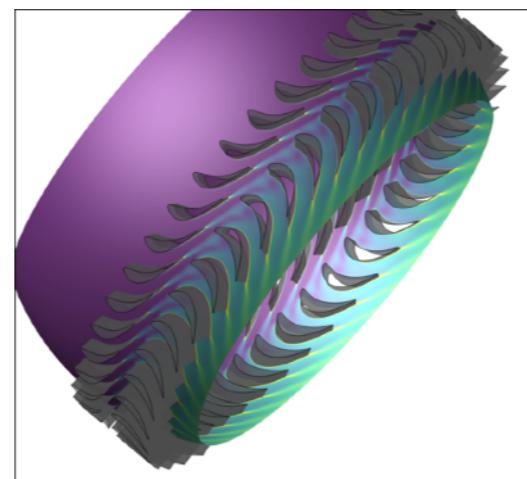
Coupled-Adjoints for CHT



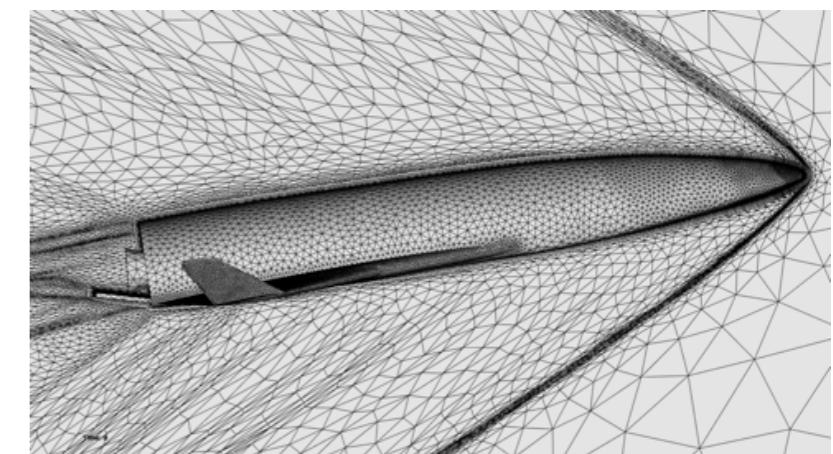
High-Order DG-FEM Solver for iLES/LES/DNS



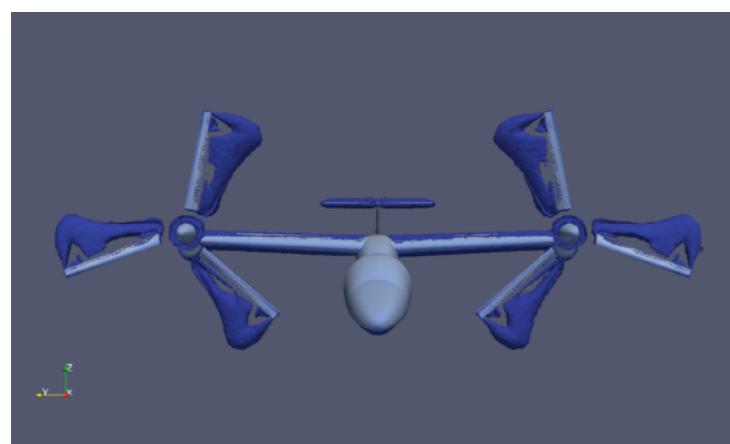
Incompressible Flows



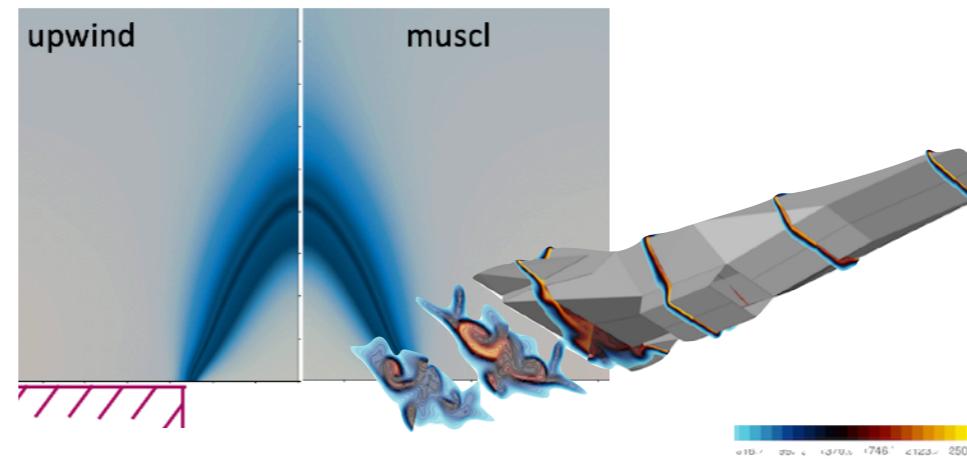
Unsteady Turbomachinery Design



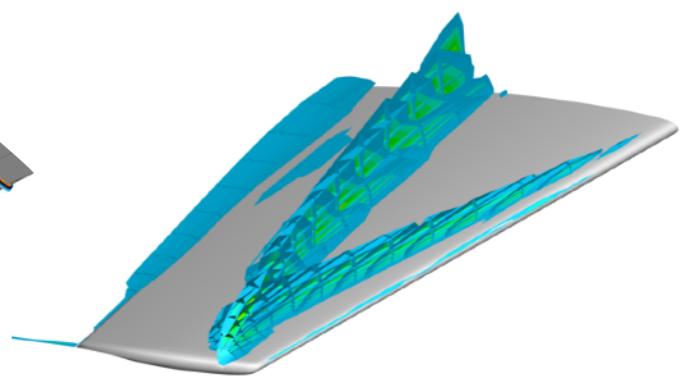
Mesh Adaptation



Rotor-Fuselage Aerodynamics



Non-Equilibrium & Reactive Flows



Uncertainty Quantification for RANS

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0930 – 1000: Conjugate heat transfer problems and computing coupled discrete adjoints using AD, O. Burghardt (TU Kaiserslautern), T. Albring, N. Gauger

1000 – 1030: Coffee break

1030 – 1100: Physics-based RANS model-form UQ in SU2, J. Mukhopadhyay (Stanford), A. Mishra, J.J. Alonso, G. Iaccarino

1100 – 1130: Aeroacoustics prediction and optimization capabilities in SU2, B. Zhou (NIA/NASA-Langley), T. Albring, N. Gauger, C. Ilario, T. Economou, J.J. Alonso, L. V. Lopes, H. Yao, S. Peng, L. Davidson

1130 – 1200: Higher-order SU2: DG-FEM solver and WENO-FV solver with LES/ILES/WMLES applications, E. van der Weide (U. of Twente), J.J. Alonso, D. Drikakis, K. Singh, P. Urbanczik, E. Molina, J.H. Choi

1200 – 1300: Lunch

1300 – 1330: Unsteady optimization with SU2: application to turbomachinery design, A. Rubino (TU Delft), M. Pini, N. Anand, P. Colonna

1330 – 1400: Preliminary results on rotor-fuselage aerodynamics using SU2: status and challenges, M. Morelli (Politecnico di Milano), G. Gori, A. Guardone

1400 – 1430: Anisotropic mesh adaptation with the INRIA AMG library, A. Loseille (INRIA), V. Menier, B. Munguia, J.J. Alonso

1430 – 1500: Coffee break

1500 – 1530: Simulation and adjoint-based design for variable density incompressible flows with heat transfer, T. Economou (Bosch)

1530 – 1600: Implementation of pressure-based Navier-Stokes for wind energy applications, A. Ravishankara (ECN part of TNO), H. Ozdemir, E. van der Weide

1600 – 1630: SU2-IDS: International Developers Society, T. Albring, R. Sanchez (TU Kaiserslautern), T. Economou, F. Palacios

1630 – 1700: Wrap up, J.J. Alonso (Stanford)

In order to participate (in-person or virtually), please register for the meeting by following the link on the SU2 home page (<https://su2code.github.io>).

*Please note that all stated times are British Summer Time (BST). **The presenter author is underlined



Institutions that have downloaded SU2. Sized by frequency.