WELCOME to the 2018 CONVERGE User Conference! We are thrilled to be back in our world headquarters of Madison, Wisconsin for this user conference celebrating ten years of CONVERGE. We are pleased to once again feature speakers and attendees from around the globe as well as keynote presentations from Argonne National Laboratory, Southwest Research Institute, and the University of Massachusetts Amherst. The diversity of presentation topics at our annual conferences highlights the versatility and broad applicability of CONVERGE's unique CFD approach to a wide array of flow problems. But even as CONVERGE is increasingly used for new applications, reacting flows remain at the heart of what we do. This is showcased by numerous presentations on combustion modeling, fuel injection, and internal combustion engines.

The theme of this year's conference is Turning 10. When we sold the first CONVERGE license in 2008, our company consisted of just a handful of engineers. The past decade has seen both setbacks and triumphs, but with a lot of hard work, a team of dedicated employees, and our amazing users, the CONVERGE community today is vibrant and thriving. Together we are facilitating new collaborations and pushing the bounds of innovation in internal combustion engines, gas turbines, pumps, compressors, and much more. We would not be where we are today without each of you. You are far more than just CONVERGE users; we truly believe that each of you is a partner and a collaborator, inspiring us to advance our product in a way that best suits the needs of the CFD community.

Our goal this week is to offer a unique, informative, and enjoyable conference. We hope this Turning 10 user conference is especially memorable and invite you all to join us in celebrating this collective achievement.

Thank you to all of our speakers for sharing your expertise with the CONVERGE community. We also thank this year's sponsors and invite you to visit their displays to learn more about their exciting products. On behalf of everyone at Convergent Science, thank you for attending our conference and we hope you enjoy the week.

Use the post processor trusted by 47,000 engineers worldwide.

tecplot. for CONVERGE

Included with your CONVERGE license.

www.tecplot.com
KEYNOTES

A DECADE WITH GRID CONVERGED CALCULATIONS | Tuesday 8:00a–8:40a

DR. SIBENDU SOM leads a CFD team at Argonne National Laboratory with a research focus on the development of nozzle flow, spray, and combustion models, as well as using HPC tools for piston engines and gas turbine applications. He is a co-founder and technical lead on Argonne’s Virtual Engine Research Institute and Fuels Initiative (VERIFI) program aimed at providing predictive simulations for OEMs. In the past decade, Dr. Som has authored several key papers using CONVERGE that have established best practices for performing robust simulations. Additionally, Dr. Som has authored more than 110 journal and peer-reviewed conference papers that have accumulated more than 3,100 citations. Dr. Som holds a B.E. in mechanical engineering from Osmania University, and received a M.S. and a Ph.D. in mechanical engineering from the University of Illinois at Chicago.

NEW HORIZONS IN ENERGY TECHNOLOGY WITH CONVERGE | Tuesday 3:45p–4:25p

DR. DAVID SCHMIDT attended North Carolina State University as an undergraduate and received a master’s in mechanical engineering from Stanford University. In 1997, he earned his Ph.D. in mechanical engineering at the University of Wisconsin–Madison. That same year, he concurrently worked as a Visiting Scientist at MIT and helped found Convergent Thinking LLC, a CFD software and consulting firm that later became Convergent Science. Dr. Schmidt has served on the faculty of the University of Massachusetts since 2000, where he is currently a professor. Dr. Schmidt’s research focuses on the fluid mechanics of two-phase flow.

NEW DEVELOPMENTS IN HIGH EFFICIENCY ENGINES | Wednesday 8:00a–8:40a

DR. TERRY ALGER is the Director of Spark Ignition Engine R&D at Southwest Research Institute (SwRI) in San Antonio, Texas. He was the leader of SwRI’s HEDGE I, II, and III consortia and the primary inventor of SwRI’s DCO ignition system and Dedicated EGR engine concept. His current responsibilities include overseeing SwRI’s activities in SI engine R&D, transmission development and testing, electrification, and vehicle emissions and fuel economy testing. He is also a fellow of the Society of Automotive Engineers. Dr. Alger received his Ph.D. in 2001 from the University of Texas at Austin and a B.S. in mechanical engineering in 1992 from the United States Military Academy.

difficulty seeing the slides?
Watch all of the presentations live on your laptop.
gotomeet.me/converge
OVERVIEW

<table>
<thead>
<tr>
<th>MORNING</th>
<th>AFTERNOON</th>
<th>EVENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MONDAY 9/24</td>
<td>CONVERGE TRAINING + TECPLLOT TRAINING</td>
<td>NETWORKING: Welcome Reception + Trivia</td>
</tr>
<tr>
<td></td>
<td>Convergent Science World Headquarters</td>
<td>Convergent Science World Headquarters</td>
</tr>
<tr>
<td>TUESDAY 9/25</td>
<td>WELCOME + PRESENTATIONS</td>
<td>NETWORKING: 10-Year Celebration + Dinner</td>
</tr>
<tr>
<td></td>
<td>The Madison Club</td>
<td>The Orpheum Theater</td>
</tr>
<tr>
<td>WEDNESDAY 9/26</td>
<td>PRESENTATIONS</td>
<td>NETWORKING: Cocktail Reception</td>
</tr>
<tr>
<td></td>
<td>The Madison Club</td>
<td>The Madison Club</td>
</tr>
<tr>
<td>THURSDAY 9/27</td>
<td>CONVERGE TRAINING</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convergent Science World Headquarters</td>
<td></td>
</tr>
<tr>
<td>FRIDAY 9/28</td>
<td>CONVERGE TRAINING</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convergent Science World Headquarters</td>
<td></td>
</tr>
</tbody>
</table>

CFD? CF-DONE.
Insanely fast simulation access, solving, and post-processing with Rescale.

www.rescale.com
**General Flow Modeling in CONVERGE**
8a-5p (there will be a 1 hour break for lunch)

**Advanced Surface Preparation Tools in CONVERGE Studio**
8a-noon

**CONVERGE**

**Tecplot for CONVERGE: Introduction to Working with ICE Data**
8a-noon

**GTO**

**Personalized Case Setup Assistance**
8a-noon

**CHARGER**

**Post-Processing Tools in CONVERGE Studio**
1p-5p

**DELOREAN 1**

**Personalized Case Setup Assistance**
1p-5p

**CHARGER**

**Personalized Tecplot Assistance**
3p-5p

**CONVERGE**

---

**Conjugate Heat Transfer Modeling**
8a-noon

**DELOREAN 1**

**Engine Aftertreatment Modeling**
8a-noon

**CORVETTE**

**Fluid-Structure Interaction Modeling**
8a-10a

**GTO**

**Tools for SAGE Detailed Chemistry**
10a-noon

**GTO**

**CONVERGE in the Cloud with Rescale**
10a-noon

**DELOREAN 2**

**Personalized Case Setup Assistance**
8a-noon

**CHARGER**

**Emissions Modeling**
1p-3p

**DELOREAN 1**

**Introduction to CONVERGE 3.0 Input Files**
1p-3p

**DELOREAN 2**

**Optimization and Model Interrogation**
1p-3p

**CONVERGE**

**Sealing**
1p-3p

**GTO**

**Spray Modeling**
3p-5p

**DELOREAN 1**

**Steady-State Modeling**
3p-5p

**CORVETTE**

**Non-Premixed Combustion Modeling**
3p-5p

**GTO**

**Personalized Case Setup Assistance**
1p-5p

**CHARGER**

---

Lunch is provided each day of training in DeLorean between noon and 1pm for all training attendees.
MORNING
7:00 – 8:00  BREAKFAST & REFRESHMENTS
7:45 – 8:00  WELCOME
            Kelly Senecal, Convergent Science
8:00 – 8:40  KEYNOTE
            A DECADE WITH GRID
            CONVERGED CALCULATIONS
            Sibendu Som, Argonne National Laboratory
8:40 – 9:05  THERMAL INSULATION MODELLING WITH CHT
            FOR LOW HEAT REJECTION DIESEL ENGINE
            Olivier Colin, IFP Energies nouvelles
9:05 – 9:30  FLAME-WALL FILM INTERACTION
            Peng Zhao, Oakland University
9:30 – 9:55  APPLICATION OF LES TO PREMIXED LOW
            TEMPERATURE COMBUSTION ENGINES
            Aimilios Sofianopoulos, Stony Brook University
9:55 – 10:10  TECHNICAL PARTNER PRESENTATION
            Tecplot
10:10 – 10:30  BREAK
10:30 – 10:55  STEADY STATE CALIBRATION DEVELOPMENT
            FOR PASSENGER CAR DIESEL ENGINES LEVER-
            AGING GRAPHICAL PROCESSING UNITS (GPUS)
            Ronald Grover Jr., General Motors
10:55 – 11:20  FURTHER APPLICATION OF THE FAST
            TABULATED CPV APPROACH
            Adina Werner, Brandenburg University
            of Technology
11:20 – 11:45  DEVELOPING RELIABLE SURROGATE
            MECHANISMS FOR COMBUSTOR MODELING
            Henry Curran, Computational Chemistry
            Consortium (C3)
11:45 – 12:00  TECHNICAL PARTNER PRESENTATION
            TotalCAE
12:00 – 13:00  LUNCH

AFTERNOON / EVENING
1:30 – 155  FLAME CHARACTERISTICS DURING LEAN
            BLOW-OUT IN GAS TURBINE COMBUSTORS
            Prithwish Kundu, Argonne National Laboratory
155 – 220  NUMERICAL INVESTIGATION OF A PREMIXED
            DUMP COMBUSTOR USING LES
            Madhu Vellakal, National Center for
            Supercomputing Applications
220 – 245  LES OF A STRATIFIED TURBULENT BURNER
            USING THICKENED FLAME MODEL AND AMR
            Cédric Mehl, IFP Energies nouvelles
245 – 310  TECHNICAL ACHIEVEMENTS IN GAS TURBINES
            AND AFTERTREATMENT
            Scott Drennan, Convergent Science
3:10 – 3:25  TECHNICAL PARTNER PRESENTATION
            CAESES
3:25 – 3:45  BREAK
3:45 – 4:25  KEYNOTE
            NEW HORIZONS IN ENERGY TECHNOLOGY
            WITH CONVERGE
            David Schmidt, University of
            Massachusetts Amherst

6:00 – 10:00  10-YEAR CELEBRATION + DINNER
            THE ORPHEUM THEATER
            Dianna Cowern, Physics Girl
            Jamie McNaughton, Roush Yates Engines
            Kelly Senecal, Convergent Science
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Organizer/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00</td>
<td>BREAK &amp; REFRESHMENTS</td>
<td></td>
</tr>
<tr>
<td>7:50</td>
<td>WELCOME BACK</td>
<td>Elizabeth Favreau &amp; Erik Tylczak, Convergent Science</td>
</tr>
<tr>
<td>8:00</td>
<td>KEYNOTE</td>
<td>Terry Alger, Southwest Research Institute</td>
</tr>
<tr>
<td>8:40</td>
<td>SIMULATION OF SPARK-IGNITION COMBUSTION FOR CO-OPTIMIZATION OF FUELS AND ENGINES</td>
<td>Zongyu Yue, Argonne National Laboratory</td>
</tr>
<tr>
<td>9:05</td>
<td>A COMPREHENSIVE AND ROBUST IGNITION SYSTEM MODEL FOR SI ENGINES</td>
<td>Haiwen Ge, Virtual Thermal Fluids LLC, Oakland University</td>
</tr>
<tr>
<td>9:30</td>
<td>MODELING ADVANCED IGNITION SYSTEMS IN CONVERGE</td>
<td>Riccardo Scarcelli, Argonne National Laboratory</td>
</tr>
<tr>
<td>9:55</td>
<td>TECHNICAL PARTNER PRESENTATION</td>
<td>Rescale</td>
</tr>
<tr>
<td>10:10</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>10:30</td>
<td>AERODYNAMIC AND COMBUSTION LARGE-EDDY SIMULATIONS OF ENGINE CONFIGURATIONS</td>
<td>Anthony Robert, IFP Energies nouvelles</td>
</tr>
<tr>
<td>10:55</td>
<td>SURROGATE IMPACT ON FLAME PROPAGATION AND KNOCK PREDICTION</td>
<td>Corinna Netzer, Brandenburg University of Technology</td>
</tr>
<tr>
<td>11:20</td>
<td>AUTOIGNITION PROCESSES IN ADVANCED INTERNAL COMBUSTION ENGINES</td>
<td>Andrew Zdanowicz, Colorado State University</td>
</tr>
<tr>
<td>11:45</td>
<td>TECHNICAL PARTNER PRESENTATION</td>
<td>Intelligent Light</td>
</tr>
<tr>
<td>12:00</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>1:30</td>
<td>CONFESSIONS OF A SPRAY EXPERIMENTALIST</td>
<td>Lyle Pickett, Sandia National Laboratory</td>
</tr>
<tr>
<td>1:55</td>
<td>FUEL EFFECT ON SPRAY UNDER COMPRESSION IGNITION ENGINE CONDITIONS</td>
<td>Yuanjiang Pei, Aramco Research Center - Detroit</td>
</tr>
<tr>
<td>2:20</td>
<td>AN OVERVIEW OF MULTIPHASE FLOW MODELING AT ARGONNE NATIONAL LABORATORY</td>
<td>Gina Magnotti, Argonne National Laboratory</td>
</tr>
<tr>
<td>2:45</td>
<td>ENGINE OPTIMIZATION USING MACHINE LEARNING EMULATORS</td>
<td>Dan Probst, Convergent Science</td>
</tr>
<tr>
<td>3:10</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>3:30</td>
<td>THE POWER OF SIMULATION IN RACING AT ROUSH YATES ENGINES</td>
<td>Brian Kurn, Roush Yates Engines</td>
</tr>
<tr>
<td>3:55</td>
<td>CFD DEVELOPMENT OF THE LIQUIDPiston ROTARY ENGINE</td>
<td>Mike Bergin, Liquid Piston</td>
</tr>
<tr>
<td>4:20</td>
<td>MODELING FLOWS IN TWIN SCREW SUPERCHARGERS AND EXHAUST HEAT RECOVERY UNITS</td>
<td>David Rowinski, Convergent Science</td>
</tr>
<tr>
<td>4:45</td>
<td>CHANGING THE GAME (AGAIN) WITH CONVERGE 3.0</td>
<td>Keith Richards, Convergent Science</td>
</tr>
<tr>
<td>5:10</td>
<td>CLOSING REMARKS</td>
<td></td>
</tr>
<tr>
<td>5:40</td>
<td>COCKTAIL RECEPTION</td>
<td>Madison Club</td>
</tr>
</tbody>
</table>

FieldView will help you deliver your best work, stand out from the crowd and increase the impact that CFD makes for your organization.

Fast and memory efficient for large unsteady results
Side-by-side comparison across multiple cases
Easy and powerful automation

www.ilight.com
**WELCOME RECEPTION & TRIVIA**  
*Monday, 7p – 10p*  
*Convergent Science World Headquarters*

Whether you’re a trivia buff or novice, join us for an evening of food, drinks, and fun! Our third-ever user conference trivia event will provide a chance to continue the camaraderie and friendly rivalries.

---

**10-YEAR CELEBRATION + DINNER**  
*Wednesday, 6p – 10p*  
*The Orpheum Theater*

Ten years of CONVERGE calls for a celebration! Please join us for an extraordinary evening at the historic Orpheum Theater on State Street in Madison. Enjoy great speakers, food, and entertainment in a festive environment with CONVERGE colleagues from around the world. Renew old connections and make new contacts throughout the evening. This is one event you don’t want to miss!

---

**COCKTAIL RECEPTION**  
*Wednesday, 5:10p (immediately following the presentations)*  
*The Madison Club*

Join us for an evening of light food and drinks at the beautiful Madison Club and enjoy one final evening with CONVERGE colleagues from around the globe.
DIANNA COWERN
Physics Girl

DIANNA COWERN is a science communicator and educator. She is the content creator for her YouTube channel, Physics Girl with PBS Digital Studios, which has over 1 million subscribers and tens of millions of views. Dianna received her BS in physics from MIT before researching low-metallicity stars at the Harvard CfA and designing an iPad app as a software engineer at GE. She then pursued her career in STEM outreach working as an educator at the Reuben H Fleet Science Center and as a physics outreach coordinator at UCSD. Her work on Physics Girl has been featured on the Huffington Post, Slate Magazine, and Scientific American blogs.

JAMIE MCNAUGHTON
Technical Director
Roush Yates Engines

JAMIE MCNAUGHTON, Technical Director of Roush Yates Engines, manages the technical engineering content and guides the strategic direction of all in-house powertrain programs.

McNaughton and his team work in partnership with Ford Performance on the design, development, and test strategies for the NASCAR Ford FR9 V8 engine platforms, as well as the twin-turbo Ford EcoBoost V6 and Ford Shelby GT350R-C V8 road race engine programs, and Roush Yates Engines’ own RY45 engine program.

Prior to joining Roush Yates Engines in 2013, he led the design and development of several production and race engine programs while working at Ford Motor Company and Harley-Davidson Motor Company, which took him around the world to Austria, Italy, Germany and India.

He has been involved in motorsports for over 30 years and enjoys the challenge of competition, winning, and teamwork.

KELLY SENECAL
Co-Owner
Convergent Science

KELLY SENECAL, Convergent Science vice president and co-owner, takes you on a look back at the trials, triumphs, and breakthroughs of the evolution of CONVERGE. A history of tears and cheers sets the stage for a bright prospective for the next 10 years.
VISION

To provide the most accurate and complete computational chemistry combustion and emissions models, tools, and mechanisms to the entire scientific community.

MISSION

Through knowledge sharing, recurring meetings, and financial support, the consortium will work to refine existing computational chemistry tools and to develop new models, tools, and mechanisms.

VALUES

The consortium values an open mechanism format to ensure widespread use.

The consortium values the contributions of both industry and academic/government partners.

The consortium values long-term validation and development by the entire combustion community.

INFORMATION

For more information, to sign up for email updates, and to become a member, please visit fuelmech.org.
UC 2019—SAVE THE DATES!

MARCH 11-15, 2019
Barcelona, Spain

SEPTEMBER 23-27, 2019
New Orleans, LA

SPONSORS

Thank you to our 2018 User Conference sponsors!
Five locations to serve our clients better.

**WORLD HEADQUARTERS**
6400 Enterprise Lane  
Madison, WI 53719  
+1 (608) 230-1500

**TEXAS**
1619 E. Common Street  
Suite 1204  
New Braunfels, TX 78130  
+1 (830) 625-5005

**DETROIT**
21500 Haggerty Road  
Suite 120  
Northville, MI 48167  
+1 (248) 465-6005

**EUROPE**
Hauptstrasse 10  
4040 Linz, Austria  
+43 720 010 660

**INDIA**
Office #701,  
Supreme Headquarters  
Mumbai-Bangalore Highway  
Baner, Pune, Maharashtra 411045  
+91 741-0000-870

**ONLINE**
convergecfd.com  
info@convergecfd.com