CONVERGENT SCIENCE 1997–2022

Global CONVERGE User Conference

September 19-23, 2022 | Madison, Wisconsin

WELCOME

Welcome to the 2022 Global CONVERGE User Conference! After several years of online events, we're so excited to be back in person for a special conference celebrating the 25th anniversary of Convergent Science. To commemorate this milestone, it seemed only fitting to hold the conference in Madison, Wisconsin, back where it all started a quarter century ago.

We're thrilled to be featuring an exemplary lineup of speakers, including keynote presentations from Aramco Americas' Detroit Research Center, Daimler Truck AG, and General Motors Research and Development. Our speakers are discussing a diverse array of topics, from battery thermal runaway to hydrogen combustion, from biological flows to engine optimization.

In addition to our technical presentations, we're hosting a student poster session to highlight some of the amazing work happening at universities around the world. We're also pleased to be offering more than two dozen in-person training courses taught by our skillful CONVERGE engineers. And of course, it wouldn't be a CONVERGE User Conference without some networking events! This year, we have food, drinks, and trivia at our welcome reception and a Madison scavenger hunt followed by dinner at The Coopers Tavern.

When we registered our company on a brisk December day in 1997, we could never have imagined where we would be now. We're incredibly grateful to all of you, our customers and partners, who have made this journey possible for us. We're also looking forward to the future, to continuing to develop CONVERGE to best meet the needs of our changing society.

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

KELLY SENECAL
Co-Owner & Vice President
Convergent Science

SCHEDULE AT A GLANCE

	DAY	EVENING
MONDAY SEPTEMBER 19	**CONVERGE Training** CS World Headquarters *See schedule for room assignment*	
TUESDAY SEPTEMBER 20	**CONVERGE Training** CS World Headquarters *See schedule for room assignment*	**Welcome Reception + Trivia** CS World Headquarters
WEDNESDAY SEPTEMBER 21	**Welcome + Presentations** Monona Terrace *Hall of Ideas – Room H*	**Dinner + Scavenger Hunt** The Coopers Tavern
THURSDAY SEPTEMBER 22	**Presentations** Monona Terrace *Hall of Ideas – Room H*	**Closing Reception** Monona Terrace *Grand Terrace*
FRIDAY SEPTEMBER 23	**CONVERGE Training** CS World Headquarters *See schedule for room assignment*	

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TRAINING SCHEDULE

MONDAY, SEPTEMBER 19 | *Convergent Science World Headquarters*

ROOM*	**DELOREAN**	**CORVETTE**	**GTO**	**CHARGER**
8:00	Conjugate Heat Transfer Modeling	Advanced Surface Preparation Tools in CONVERGE Studio	Fluid-Structure Interaction Modeling	CONVERGE for Engine Aftertreatment Systems
9:00				
10:00			Emissions Modeling	
11:00				
12:00	LUNCH	LUNCH	LUNCH	LUNCH
1:00	Electromobility Modeling	Heat Transfer Mapping	Chemisty Tools	Inlaid Meshing
2:00				
3:00	Spray Modeling	Steady-State Modeling in CONVERGE	Premixed Combustion Modeling	Sealing
4:00				

Personalized Case Setup Assistance is available on Monday, Tuesday, and Friday from 8 AM-noon and 1-5 PM. Sessions must be scheduled in advance.

*****Room assignments are subject to change. Please confirm the room assignments onsite.*

TUESDAY, SEPTEMBER 20 | *Convergent Science World Headquarters*

ROOM*	**DELOREAN**	**CORVETTE**	**GTO**	**CHARGER**
8:00	H2 Combustion	Turbulence Modeling	Optimization and Model Interrogation	Post-Processing Tools in CONVERGE Studio
9:00				
10:00	Non-Premixed Combustion Modeling	Compressor and Pump Modeling	CONVERGE + GT-SUITE Coupling	
11:00				
12:00	LUNCH	LUNCH	LUNCH	LUNCH
1:00	User-Defined Functions	Volume of Fluid Modeling	Advanced Topics in Internal Combustion Engine Modeling	Radiation Modeling
2:00				
3:00	What's New in CONVERGE 3.1			
4:00				

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KEYNOTE SPEAKERS

SCOTT E. PARRISH, PH.D.

GM Technical Fellow and Lab Group Manager | *General Motors R&D*

Dr. Scott E. Parrish is a GM Technical Fellow and a Lab Group Manager within the Propulsion Systems Research Laboratory at General Motors Research and Development. With over 25 years of experience, Dr. Parrish is a recognized expert in the development and application of advanced measurement diagnostics and numerical models to develop ICE and electrified propulsion systems. He currently leads the development of experimental methods and multi-physics models to characterize electric motors and batteries. His prior work involved the development of novel fuel spray and injector flow characterization capabilities, used extensively to develop GM combustion systems. Dr. Parrish holds a Ph.D. in mechanical engineering from the University of Wisconsin–Madison.

DEVELOPMENT AND APPLICATION OF HIGH-FIDELITY, MULTI-PHYSICS NUMERICAL MODELS TO DEVELOP PROPULSION SYSTEM COMPONENTS FOR ELECTRIC VEHICLES

8:10 AM, Wednesday, September 21

YUANJIANG PEI, PH.D.

Computational Modeling Team Lead

Aramco Americas' Detroit Research Center

Dr. Yuanjiang Pei leads the Computational Modeling Team at the Aramco Americas' Detroit Research Center, focusing on innovating and developing sustainable transport technologies. Dr. Pei has 14 years of experience working in the powertrain and energy industry. He joined Aramco in late 2015 after working at Argonne National Laboratory and Delphi. Dr. Pei has published more than 85 peer-reviewed research papers with more than 2,000 citations. He has received several prestigious international awards, including HPCwire Awards three years in a row and the ASME 2019 Chairman's Distinguished Service Award. He received his Ph.D. in mechanical engineering from the University of New South Wales.

THE ROLE OF HIGH FIDELITY AND HIGH THROUGHPUT COMPUTATIONAL MODELING IN DEVELOPING LOW CLIMATE IMPACT TRANSPORT TECHNOLOGIES

1:45 PM, Wednesday, September 21

DR.-ING. AMER AVDIĆ, PH.D.

Senior Simulation Engineer | *Daimler Truck AG*

Dr.-Ing. Amer Avdić is a Senior Simulation Engineer at Daimler Truck AG. He obtained his bachelor's and master's degrees in mechanical engineering with honors from the University of Sarajevo. Dr.-Ing. Avdić specialized in CFD and combustion simulation during his doctoral studies at the Technical University of Darmstadt and as a postdoctoral researcher. Starting as a Senior Simulation Engineer at Opel Automobile GmbH, he was responsible for in-cylinder 3D CFD simulations, including novel fuel research projects. In his current position at Daimler Truck AG, he is responsible for the coordination and execution of CAE simulation projects in the field of alternative powertrain development, with a focus on turbulent in-cylinder flow, mixture preparation, and combustion.

PREDICTING HYDROGEN COMBUSTION IN HEAVY DUTY INTERNAL COMBUSTION ENGINES

8:10 AM, Thursday, September 22

NETWORKING EVENTS

WELCOME RECEPTION + TRIVIA

CONVERGENT SCIENCE WORLD HEADQUARTERS
6:30-9:30 PM, Tuesday, September 20

Connect with other CONVERGE users and unwind at this evening reception with food, refreshments, posters, and trivia!

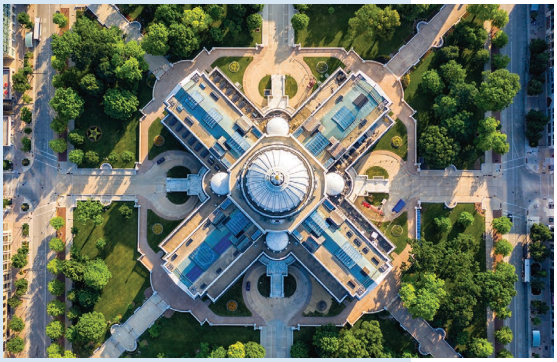
Food and beverages will be served.

SCAVENGER HUNT + DINNER

THE COOPERS TAVERN
6:00-10:00 PM, Wednesday, September 21

Join us for a scavenger hunt starting at the Monona Terrace, moving through downtown Madison, and finishing at The Coopers Tavern for dinner and drinks.

Food and beverages will be served.

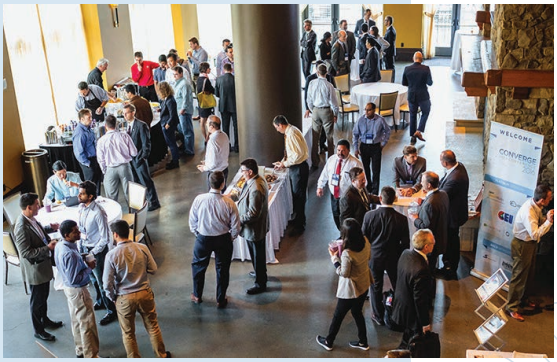


CLOSING RECEPTION

MONONA TERRACE - GRAND TERRACE
5:30-6:30 PM, Thursday, September 22

Enjoy Wisconsin-themed snacks and beverages with a view overlooking Lake Monona.

Snacks and beverages will be served.



CONFERENCE SCHEDULE

WEDNESDAY, SEPTEMBER 21 | *Monona Terrace, Hall of Ideas-Room H*

7:00	REGISTRATION | BREAKFAST & REFRESHMENTS
8:00	**WELCOME** | Kelly Senecal | *Convergent Science*
8:10	**KEYNOTE | Development and Application of High-Fidelity, Multi-Physics Numerical Models to Develop Propulsion System Components for Electric Vehicles** Scott Parrish | *General Motors R&D*
8:50	**Thermal Runaway and Vent Gas Ignition Simulation of a Battery Pack Using LES** Veeraraghavan Viswanathan | *Convergent Science*
9:15	**Simulation of Thermal Runway Propagation in a Lithium-Ion Battery Module** Adèle Poubeau | *IFP Energies nouvelles*
9:40	**Advances in CONVERGE Battery Modeling Tools** | Kislaya Srivastava | *Convergent Science*
10:05	BREAK
10:30	**Go With the Flow: Modeling FSI and Complex Moving Boundaries With CONVERGE** Jasim Sadique | *Convergent Science*
10:55	**CFD Simulation of Face Shield Effects on an Emitter During a Cough Process** Teng Deng | *Huazhong University of Science and Technology*
11:20	**CFD Validation of a Controllable Pitch Marine Propeller Using Truly Autonomous Mesh Generation With Adaptive Mesh Refinement** | Mathias Vangö | *Convergent Science*
11:45	**Development of a Data-Driven Wall Function Methodology for Complex Flows** Erwan Rondeaux | *IFP Energies nouvelles*
12:10	**SPONSOR** | TotalCAE
12:25	LUNCH
1:30	**SPONSOR** | Tecplot
1:45	**KEYNOTE | The Role of High Fidelity and High Throughput Computational Modeling in Developing Low Climate Impact Transport Technologies** Yuanjiang Pei | *Aramco Americas' Detroit Research Center*
2:25	**Automated Optimization of Pre-Chamber Geometry Using CFD** Ahmad Hadi Bakir | *University of Tennessee Space Institute*
2:50	**Heavy-Duty Flex-Fuel Mixing Controlled Combustion Enabled by Prechamber Ignition** Jared Zeman | *Marquette University*

3:15	**An Overview of the Pre-Chamber Engine Modeling at KAUST** Mickael Silva | *Clean Combustion Research Center at KAUST*
3:40	BREAK
4:05	**4D Flow MRI-Based CFD for Flow Dynamics Assessment in Coarctation of the Aorta** Labib Shahid | *University of Wisconsin–Madison*
4:30	**Introducing CONVERGE Horizon** | Cooper Burns | *Convergent Science*
4:55	**Rapid Exhaust Port Optimization Using High Performance Computing and Machine Learning Methodologies** | Jacob Hanson | *Polaris Industries*
5:20	**CLOSING** | *Convergent Science*
6:00	**NETWORKING EVENT** | Scavenger Hunt + Dinner at The Coopers Tavern

CONFERENCE SCHEDULE

THURSDAY, SEPTEMBER 22 | *Monona Terrace, Hall of Ideas-Room H*

7:00	REGISTRATION | BREAKFAST & REFRESHMENTS
8:00	**WELCOME** | Kelly Senecal | *Convergent Science*
8:10	**KEYNOTE | Predicting Hydrogen Combustion in Heavy Duty ICE** Amer Avdić | *Daimler Truck AG*
8:50	**Development of an Optimal H2 Combustion Engine: Comprehension and Requirements** Olivier Laget | *IFP Energies nouvelles*
9:15	**Numerical Modeling of Fuel-Air Mixing in a Direct Injection Hydrogen Engine** Bifen Wu | *Argonne National Laboratory*
9:40	**Computational Study of Hydrogen CI Combustion in an OP2S Engine** Ming Huo | *Achates Power*
10:05	BREAK
10:30	**Modeling Hydrogen Combustion in IC Engines Using Detailed Chemistry** Sameera Wijeyakulasuriya | *Convergent Science*
10:55	**High Hydrogen Blends Combustion in Microturbine Combustors** Joshua Christopher | *Argonne National Laboratory*
11:20	**Simulation of Mode Transition in Hydrogen-Based Rotating Detonation Engine (RDE)** Veeraraghava Raju Hasti | *Purdue University*
11:45	**Numerical Investigation of Vaporization and Ignition of Ammonia Sprays** Ahmad Hadi Bakir | *University of Tennessee Space Institute*
12:10	LUNCH
1:10	**Impact of Thermophysical Properties on Materials Temperature Predictions** Charles E.A. Finney | *Oak Ridge National Laboratory*
1:35	**Simulation of Combustion Systems Using Neural Networks** Cédric Mehl | *IFP Energies nouvelles*
2:00	**CFD Simulations of an Optical RCM Using Gasoline/Ethanol Blends** Musharrat Chowdhury | *Marquette University*
2:25	**Non-Reacting and Reacting Spray A Simulations With Synthetic Biofuels** Prashant Goel | *Politecnico di Torino*
2:50	**Exploiting the Potential of LES for Ducted Fuel Injection Investigation** Andrea Bianco | *POWERTECH Engineering*

3:15	BREAK
3:40	**CFD Simulations of Stratification and Charge Cooling Effects on a GDCI Engine** Haiwen Ge | *Texas Tech University*
4:05	**ChemNODE: A Robust ML Framework for Efficient Chemical Kinetic Solvers** Tadbhagya Kumar | *Argonne National Laboratory*
4:30	**Effect of Impurities on Condensation of SCO2 in De Laval Nozzle Using RFM** Harshit Bhatia | *IFP Energies nouvelles*
4:55	**What's New & What's Coming in CONVERGE** | Keith Richards | *Convergent Science*
5:20	**CLOSING** | *Convergent Science*
5:30	**RECEPTION** | Snacks and Refreshments

CONVERGENT SCIENCE®

For more information about **CONVERGE,** please visit **convergecfd.com** or email **contact@convergecfd.com**