SOLVE THE HARD PROBLEMS

CONVERGE USER CONFERENCE NORTH AMERICA—2017

September 25–29, 2017
Detroit, MI

CONVERGE
CFD SOFTWARE

WELCOME

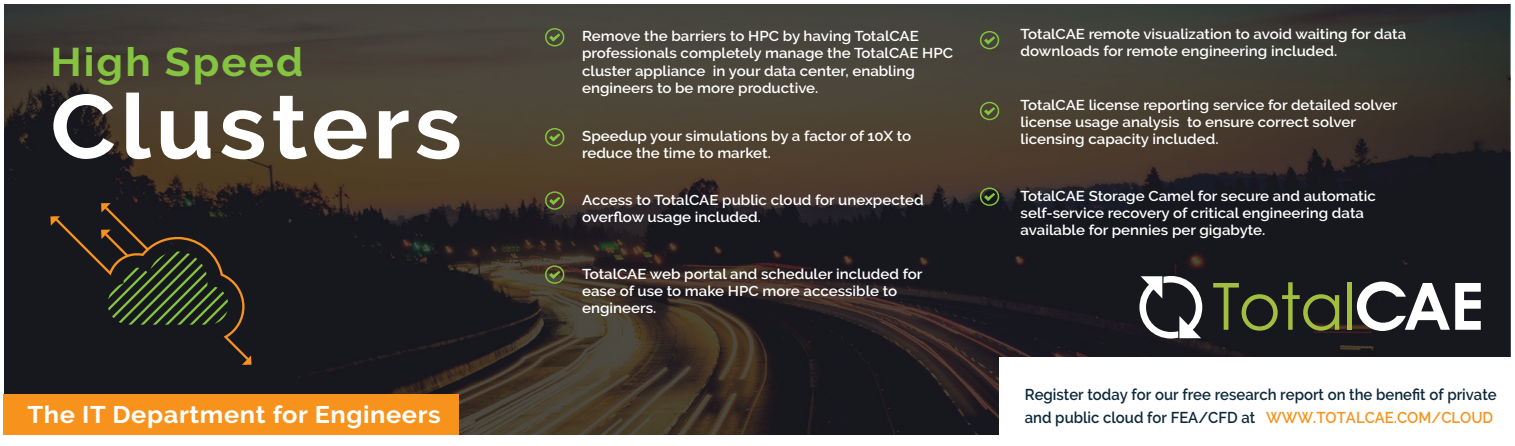
WELCOME TO THE 2017 CONVERGE USER CONFERENCE! We are delighted to have this year's North American conference in the Motor City. After all, there's no better place to host our event than Detroit, home to the three major American automotive companies and many of their suppliers. This year's conference features speakers and attendees from around the globe as well as keynote presentations from Achates Power, Aramco Services Company, and Oak Ridge National Laboratory. The diversity of presentation topics at this year's event is a testament to the applicability of CONVERGE's truly 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.

While we call this event our "User Conference," you're really much more than just a CONVERGE user. We believe that each of you is a collaborator, inspiring us to continue to innovate in a way that best meets your CFD needs. As a way of saying thank you, our goal is to offer a unique, informative, and enjoyable conference. During this week, we hope that you not only learn from fellow CONVERGE users but also have a chance to kick back and relax at our networking activities.

Our theme for this year's conference is "solve the hard problems", and this week you will hear from a number of engineers whose CONVERGE simulations include complex geometries, intricate moving boundaries, sophisticated spray and combustion models, and other powerful options. We at Convergent Science are constantly pushing the envelope when it comes to CFD, and we are determined to offer innovative CFD tools that help you tackle the hard problems.

Thank you to all of our speakers for sharing their 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 this event gives you the confidence to solve the hard problems.

Kelly Senecal
Co-Owner, Convergent Science



KEYNOTE

ROBERT WAGNER

Director, National Transportation Research Center
Oak Ridge National Laboratory

HPC DRIVING ADVANCES IN MULTI-PHYSICS SIMULATIONS

Tuesday, September 26 | 8:00-8:40

GERHARD REGNER

Vice President, Performance and Emissions
Achates Power

MASTERING CAE TECHNOLOGIES TO ENABLE EFFICIENCY GAINS IN OPPOSED-PISTON ENGINES

Tuesday, September 26 | 2:35-3:15

DAVID J. CLEARY

Director, Fuel Technology Research Center
Aramco Services Company

TRANSPORTATION ENERGY AND ICE TECHNOLOGY PATHWAYS

Wednesday, September 27 | 8:00-8:40

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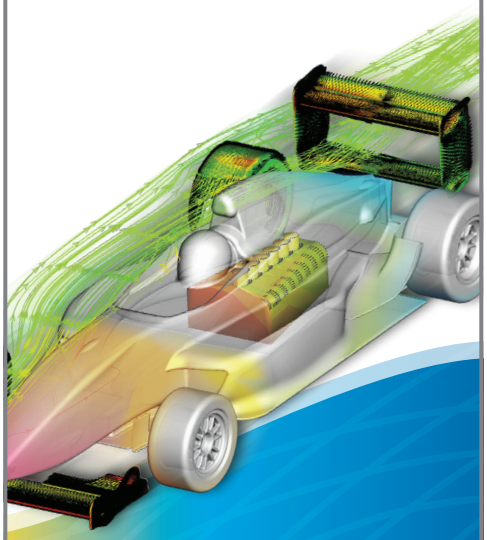


CFD Visualization and Analysis

OVERVIEW

MONDAY | September 25

8A – 5P | TRAINING

6P | WELCOME RECEPTION

TUESDAY | September 26

7:45A – 5P | CONFERENCE

6P | FORD FACTORY TOUR

WEDNESDAY | September 27

7:55A – 5:45P | CONFERENCE

6P | DINNER SOCIAL

THURSDAY | September 28

8A – 5P | TRAINING

FRIDAY | September 29

8A – 5P | TRAINING

TRAINING

MONDAY | September 25

FAIRLANE:	8AM-5PM Internal Combustion Engine Modeling in CONVERGE			
ROUGE RIVER:	8AM-5PM Basic EnSight 10.2			
EDISON A:	8AM-5PM Advanced EnSight 10.2			
GROSSE POINTE:			1PM-4PM Post-Processing Tools in CONVERGE Studio	

THURSDAY | September 28

SALON III:	8AM-12NOON Advanced Conjugate Heat Transfer Modeling	12NOON-1PM Lunch With Rescale: CONVERGE in the Cloud	1PM-3PM Advanced Spray Modeling	3PM-5PM Advanced Turbulence Modeling
SALON IV:	8AM-12NOON Engine Aftertreatment Modeling		1PM-3PM Steady-State Modeling in CONVERGE	3PM-5PM Advanced Emissions Modeling
SALON V:	8AM-10AM Heat Transfer Mapping	10AM-12NOON Tools for SAGE Detailed Chemistry	1PM-3PM Advanced Sealing	3PM-5PM CONVERGE + GT-SUITE Coupling

FRIDAY | September 29

FAIRLANE:	8AM-12NOON Advanced Combustion Modeling		1PM-5PM Advanced Topics in Internal Combustion Engine Modeling	
ROUGE RIVER:	8AM-12NOON Advanced Surface Preparation Tools in CONVERGE Studio		1PM-3PM Volume of Fluid Modeling	3PM-5PM User-Defined Functions
GROSSE POINTE:	8AM-10AM Fluid-Structure Interaction Modeling	10AM-12NOON Optimization and Model Interrogation	12NOON-1PM HPC Post-Processing & Extract-Based Workflows With Fieldview	

SCHEDULE

TUESDAY, SEPTEMBER 26

7:00-7:45	**BREAKFAST**
7:45-8:00	**WELCOME** Kelly Senecal, *Convergent Science*
8:00-8:40	**HPC DRIVING ADVANCES IN MULTI-PHYSICS SIMULATIONS** Robert Wagner, *Oak Ridge National Laboratory*
8:40-9:05	**ACCELERATING URANS CYCLE-TO-CYCLE VARIATION STUDIES VIA PARALLEL PERTURBATION METHOD** Nitesh Attal, *Convergent Science*
9:05-9:30	**CHT METHODOLOGY DEVELOPMENT, APPLICATION TO SPARK IGNITION ENGINE** Frédéric Ravet, *Renault*
9:30-9:55	**UREA DEPOSIT PREDICTIONS IN MID/HEAVY DUTY VEHICLE AFTERTREATMENT SYSTEM** Yong Sun, *Isuzu Technical Center of America*
9:55-10:10	**SPONSOR TALK — TOTALCAE**
10:10-10:25	BREAK
10:25-10:50	**A LAGRANGIAN SPRAY-WALL INTERACTION MODEL APPLIED TO HIGH-PRESSURE SPRAYS** Le Zhao and Roberto Torelli, *Michigan Technological University and Argonne National Laboratory*
10:50-11:15	**RECENT PROGRESS IN NOZZLE FLOW AND SPRAY MODELING AT ARGONNE** Roberto Torelli, *Argonne National Laboratory*
11:15-11:40	**MODELING OF LIQUID FILM VAPORIZATION UNDER BOILING CONDITION IN CONVERGE 2.4** Chaouki Habchi, *IFP Energies nouvelles*
11:40-12:05	**MODELING A GASOLINE SPRAY UNDER HEAVY-DUTY DIESEL ENGINE CONDITIONS** Yuanjiang Pei, *Aramco Services Company*
12:05-1:05	LUNCH
1:05-1:20	**SPONSOR TALK — MICROSOFT AZURE**
1:20-1:45	**SPARK IGNITION MODEL DEVELOPMENT FOR DILUTE/LEAN ENGINE COMBUSTION SIMULATIONS** Ricardo Scarcelli, *Argonne National Laboratory*
1:45-2:10	**ECFM-ISSIM VALIDATION ON PSA EB2DT ENGINE DATA BASE** Stéphane Chevillard, *IFP Energies nouvelles*
2:10-2:35	**EFFECT OF WATER INJECTION ON CHEMISTRY AND THERMODYNAMICS IN A GASOLINE ENGINE** Corinna Netzer, *Brandenburg University of Technology*
2:35-3:15	**MASTERING CAE TECHNOLOGIES TO ENABLE EFFICIENCY GAINS IN OPPOSED-PISTON ENGINES** Gerhard Regner, *Achates Power*
3:15-3:30	**SPONSOR TALK — INTELLIGENT LIGHT**
3:30-3:45	BREAK
3:45-4:10	**MOVING FROM POST-DICTION TO PREDICTION IN GAS TURBINES AND AFTERTREATMENT** Scott Drennan, *Convergent Science*
4:10-4:35	**SIMULATIONS ENABLING CO-OPTIMIZATION OF ENGINES AND FUELS** Noah Van Dam, *Argonne National Laboratory*
4:35-5:00	**CONVERGENT SCIENCE: COMPANY STATUS & FUTURE INNOVATION** Daniel Lee, *Convergent Science*
6:00	**NETWORKING:** FORD ROUGE FACTORY TOUR *Pre-registration required.*

SCHEDULE

WEDNESDAY, SEPTEMBER 27

7:00-7:55 **BREAKFAST**

7:55-8:00 **WELCOME BACK**
Katie Beutel, *Convergent Science*

8:00-8:40 **TRANSPORTATION ENERGY AND ICE TECHNOLOGY PATHWAYS**
David Cleary, *Aramco Services Company*

8:40-9:05 **GLOBAL SENSITIVITY ANALYSIS FOR INSIGHTS INTO GASOLINE COMPRESSION IGNITION**
Pinaki Pal, *Argonne National Laboratory*

9:05-9:30 **CFD SIMULATION OF AN OP2S GASOLINE COMPRESSION IGNITION ENGINE**
Rodrigo Zermeno and Ahmed Abdul Moiz, *Achates Power and Argonne National Laboratory*

9:30-9:55 **WHAT TO EXPECT IN CONVERGE 3.0**
Keith Richards, *Convergent Science*

9:55-10:10 **SPONSOR TALK — RESCALE**

10:10-10:25 BREAK

10:25-10:50 **A COMMON ENGINE PLATFORM FOR ENGINE LES DEVELOPMENT AND VALIDATION WITH CONVERGE**
Xiaofeng Yang, *General Motors*

10:50-11:15 **LES OF TURBULENT PREMIXED FLAMES USING AMR AND DETAILED CHEMISTRY**
Veeraraghava Raju Hasti, *Purdue University*

11:15-11:40 **DYNAMIC ADAPTIVE COMBUSTION MODELING OF DIESEL SPRAY FLAMES**
Chao Xu, *University of Connecticut*

11:40-12:05 **UNDERSTANDING AND PREDICTING CYCLE-TO-CYCLE VARIATION THROUGH SIMULATION**
Janardhan Kodavasal, *Argonne National Laboratory*

12:05-1:05 LUNCH

1:05-1:30 **A NEW PRF MECHANISM APPLIED TO THE PINNACLE OPPOSED-PISTON ENGINE**
Charles Finney, *Oak Ridge National Laboratory*

1:30-1:55 **CFD MODELING OF THE GAS EXCHANGE PROCESS OF A SMALL HCCI FPLA**
Aimilios Sofianopoulos, *Stony Brook University*

1:55-2:20 **SENSITIVITY ANALYSIS OF REACTION RATES OF N-DODECANE**
Joshua Piehl, *Wayne State University*

2:20-2:45 **APPLICATION AND PERFORMANCE OF CHEMISTRY SOLVERS ON THE TITAN SUPERCOMPUTER**
Russell Whitesides, *Lawrence Livermore National Laboratory*

2:45-3:10 **RECENT PROGESS IN TURBULENT COMBUSTION MODELING FOR CI AND SI ENGINES AT ANL**
Prithwish Kundu, *Argonne National Laboratory*

3:10-3:25 **SPONSOR TALK — TECPLOT**

3:25-3:40 BREAK

3:40-4:05 **A SPECIES BASED IMPLEMENTATION OF ECFM3Z IN CONVERGE**
Olivier Colin, *IFP Energies nouvelles*

4:05-4:30 **ETHANOL MECHANISM DEVELOPMENT AND VALIDATION USING AUTOMATED REACTION GENERATOR**
Antowan Zyada, *Wayne State University*

4:30-4:55 **EMISSION PREDICTION AND VALIDATION**
Tom Shieh, *Toyota USA*

4:55-5:20 **COUPLING OF PHYSICS BASED SEMI-EMPIRICAL SOOT MODEL WITH 3D CFD COMBUSTION MODEL**
Saurabh Sharma, *Isuzu Technical Center of America*

5:20-5:45 **TURBULENT SPRAY COMBUSTION MODELING USING DIC AND FGM**
Joshua Piehl, *Wayne State University*

6:00 **NETWORKING:** DINNER SOCIAL—DEARBORN INN
Pre-registration required.

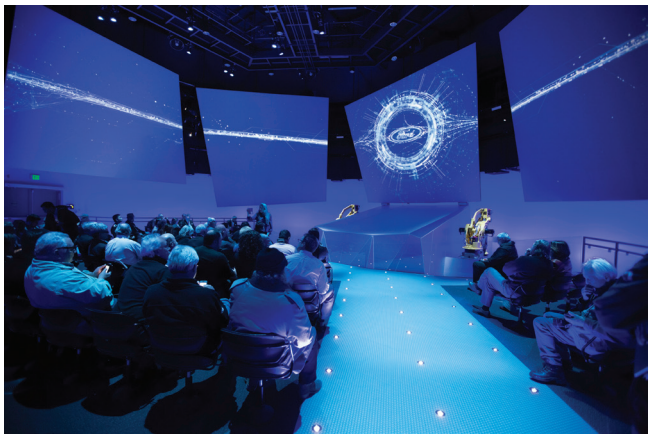
NETWORKING

6:00PM, MONDAY, SEPTEMBER 25

WELCOME RECEPTION

THE DEARBORN INN

Welcome to the CONVERGE User Conference-North America 2017. We invite you to join us as we kick off this week of connection and sharing. Food and beverages will be served.



6:00PM, TUESDAY, SEPTEMBER 26

FORD ROUGE FACTORY TOUR

THE HENRY FORD AND FORD ROUGE FACTORY

Join us for a celebration of American engineering ingenuity and innovation–past, present, and future. The Ford Rouge Factory Tour offers an up-close look at the design and manufacture of the iconic Ford F-150, as well as an exploration of the storied past and future of The Ford Motor Company itself. Dinner will be served.

6:00PM, WEDNESDAY, SEPTEMBER 27

DINNER SOCIAL

THE DEARBORN INN

Enjoy dinner in a relaxed atmosphere with new and old friends accompanied by live music from local band Wide Angle. Door prizes and giveaways will be awarded.

CFD is complex.

Learning CFD software shouldn't be.

Convergent Science offers ***free*** introductory and advanced training sessions throughout the year at our offices in the US and Europe.

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COMPUTATIONAL CHEMISTRY CONSORTIUM

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**.

Gold Sponsor

Thank you to our gold sponsor Esteco!

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Rescale provides an industry-leading, high-security cloud simulation platform specifically designed for computer-aided engineering (CAE) simulation. With a focus on high-performance computing (HPC), enterprise companies can leverage Rescale's innovative platform solution to seamlessly execute complex simulations securely from anywhere in the world.

Rescale partners with leading software vendors to provide on-demand access to a variety of simulation packages, including CONVERGE, while simultaneously offering customizable HPC hardware. There are no job queues and large-scale capacity (10,000+ cores) is immediately configurable for a wide variety of simulation needs.

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