



CONVERGE
USER CONFERENCE
— EUROPE 2019 —

BARCELONA

CONVERGE User Conference-Europe 2019 | 11-15 March 2019 | Barcelona, Spain

WELCOME



RAINER ROTHBAUER
Co-Owner & General Manager
Convergent Science GmbH



WELCOME to the 2019 **CONVERGE** European User Conference! This is our third annual European User Conference, following last year's fun and successful event in Bologna.

This conference features speakers and attendees from Europe and around the globe. Reacting flows are at the heart of what we do, and we are pleased to offer many engine-related presentations, including keynotes by research leaders from MAHLE Powertrain, NUI Galway, and Renault SAS. In addition to engine simulations, **CONVERGE's** truly unique CFD approach is applicable to a wide variety of flow problems. This conference also includes presentations on diverse topics such as pumps and compressors, conjugate heat transfer, fluid-structure interaction, gas turbines, aftertreatment systems, and fuel injectors.

While we call this event our "User Conference," you're much more than just **CONVERGE** users. We believe that each of you is a collaborator, inspiring us to continue to push the limits 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. In keeping with **CONVERGE** UC tradition, we are offering free training courses after the conference. During the conference itself, we have a variety of daytime and evening events so you can network with colleagues and experience the beautiful city of Barcelona. For example, we'll be enjoying a delicious dinner at La Font de Prades Restaurant in Barcelona's historic district Poble Espanyol. Additionally, since last year's F1 race simulator at the Ferrari Museum was enthusiastically received, it was only natural to go to the next level and arrange a friendly kart race at Parcmotor Castellolí.

Thank you to all of our speakers for sharing your expertise with the **CONVERGE** community. Thank you to this year's sponsors—we encourage you to visit their displays to learn more about their exciting products. On behalf of everyone at Convergent Science, thank you for attending the **CONVERGE** European User Conference, and we hope you enjoy the week in Barcelona.

CONFERENCE SCHEDULE AT A GLANCE

	DAY	EVENING
MONDAY, 11 MARCH	Travel	Welcome Drinks Hotel Porta Fira Nixe Palace II
TUESDAY, 12 MARCH	Welcome + Presentations Hotel Porta Fira Arenas IV	Networking Dinner Restaurant La Font de Prades - Poble Espanyol
WEDNESDAY, 13 MARCH	Presentations Hotel Porta Fira Arenas IV	Networking Dinner + Karting Karting Parcmotor Castellolí
THURSDAY, 14 MARCH	CONVERGE Training Hotel Porta Fira See schedule for room assignment	
FRIDAY, 15 MARCH	CONVERGE Training Hotel Porta Fira See schedule for room assignment	

KEYNOTE SPEAKERS



HUGH BLAXILL, M.S.
General Manager
MAHLE Powertrain, LLC

MAHLE JET IGNITION AS AN ADVANCED FUEL ECONOMY SOLUTION 08:40-09:20, Tuesday, 12 March

Hugh Blaxill has been General Manager at MAHLE Powertrain, LLC for eight years. He is responsible for the Engineering and Project Management teams in Plymouth, Michigan. Prior to moving to the U.S., he was responsible for MAHLE Powertrain's research and development team in the UK. Mr. Blaxill joined MAHLE Powertrain (at the time Cosworth) from Ricardo, where he spent four years doing light duty diesel combustion and mechanical development projects. He received a master's degree in engineering from the University of Bath. Mr. Blaxill is a Fellow of the Institute of Mechanical Engineers in the UK and has authored numerous technical papers and holds a number of patents, the majority of which are in the area of combustion development.



HENRY CURRAN, Ph.D.
Priority Research Area
Leader in Energy
NUI Galway

PROGRESS ON CHEMICAL KINETIC MECHANISM DEVELOPMENT 13:40-14:20, Tuesday, 12 March

Professor Henry Curran is the director of the Combustion Chemistry Centre and Priority Research Area leader in Energy at the National University of Ireland, Galway (NUIG). He received a Ph.D. in experimental and numerical studies of combustion kinetics in 1994 from NUIG and received a D.Sc. in 2011 from the same institution. Professor Curran is a founding member of the Irish Section of the Combustion Institute and a Fellow of the Combustion Institute, the Institute of Chemistry of Ireland, and the Royal Society of Chemistry. In 2017, he was awarded the Boyle-Higgins gold medal in chemistry by the Institute of Chemistry of Ireland, and he has been named among the top 1% of researchers cited in his field each year since 2014 by Clarivate Analytics.

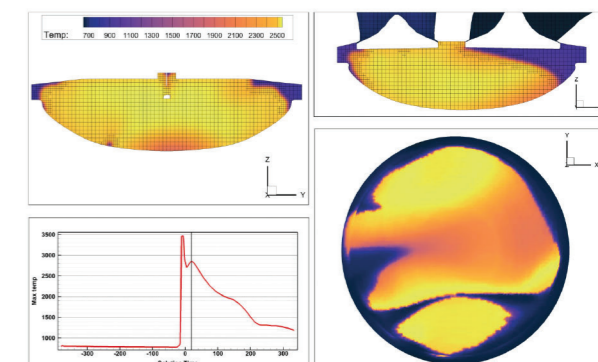


FRÉDÉRIC RAVET, Ph.D.
Expert in CFD Simulation
Applied to Powertrain
Renault SAS

SIMULATION: CRUCIAL NEEDS IN THE AUTOMOTIVE INDUSTRY 08:40-09:20, Wednesday, 13 March

Dr. Frederic Ravet earned his Ph.D. from Ecole Polytechnique de Lille, where he studied pollutants and combustion modeling in an aeronautic combustion chamber. He then worked as a combustion research team leader for Snecma, a French engine aircraft supplier. In 2004, Dr. Ravet moved to Renault SAS, a French car manufacturer, as a combustion research team leader. In 2012, he was nominated as expert in CFD applied to powertrains in charge of the development of numerical processes for designing engine applications.

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REACTIONS

! n-heptane

C7H16	+ 02	=	C7H15	+ H02	1.000E+16	0.00	46000.0	
REV					/ 1.000E+12	0.00	0.0	/
C7H15	+ 02	=	C7H15O2		3.000E+12	0.00	0.0	! modified
REV					/ 2.510E+13	0.00	27400.0	/
C7H15O2		=	C7H1400H		1.510E+11	0.00	19000.0	
REV					/ 1.000E+11	0.00	11000.0	/
C7H1400H	+ 02	=	O2C7H1400H		6.160E+10	0.00	0.0	! modified
REV					/ 2.510E+13	0.00	27400.0	/
O2C7H1400H		=>	C7KET	+ OH	8.910E+10	0.00	17000.0	
C7KET		=>	C5H11CO	+ CH20 + OH	3.980E+15	0.00	43000.0	
C5H11CO	+ 02	=>	C3H7	+ C2H3 + CO + H02	3.160E+13	0.00	10000.0	! changed
C7H16	+ 0H	=>	C7H15	+ H20	5.000E+13	0.00	3000.0	! modified
C7H15	+ 02	=	C7H14	+ H02	3.160E+11	0.00	6000.0	
REV					/ 3.160E+11	0.00	19500.0	/
C7H14	+ 02	=>	C3H6	+ C2H5 + CH20 + HCO	3.160E+13	0.00	10000.0	! combined,changed
C7H16	+ H02	=>	C7H15	+ H202	1.000E+13	0.00	16950.0	
C7H15		=>	C7H5	+ C2H5	5.000E+13	0.00	39800.0	! combined,changed,modified

CONVERGE
CFD SOFTWARE

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WELCOME DRINKS

HOTEL PORTA FIRA | NIXE PALACE II
20:00-22:00, Monday, 11 March

Connect with other **CONVERGE** users and unwind from traveling with an evening reception with complimentary drinks at the beautiful Hotel Porta Fira.
Beverages will be served.



NETWORKING DINNER

RESTAURANT LA FONT DE PRADES-POBLE ESPANYOL
18:45-23:00, Tuesday, 12 March

Join us for dinner at La Font de Prades Restaurant and stroll through the streets of the historic Poble Espanyol.
Food and beverages will be served.

18:45 - Meet in the hotel lobby for bus to Restaurant La Font de Prades
19:30 - Dinner at Restaurant La Font de Prades
22:00 - First bus returns to Hotel Porta Fira
22:30 - Second bus returns to Hotel Porta Fira



NETWORKING DINNER + KARTING

KARTING PARCMOTOR CASTELLOLÍ
15:20-23:00, Wednesday, 13 March

The first-ever **CONVERGE** kart race will pit participants against one another in a friendly competition and be accompanied by dinner.
Food and beverages will be served.

15:20 - Meet in the hotel lobby for bus to Karting Parcmotor Castellolí
16:30 - Refreshments and registration at Karting Parcmotor Castellolí
17:00 - Karting
19:30 - Dinner at Karting Parcmotor Castellolí
21:30 - First bus returns to Hotel Porta Fira
22:00 - Second bus returns to Hotel Porta Fira



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CONFERENCE SCHEDULE

TUESDAY, 12 MARCH

ROOM ARENAS IV

08:00 Registration

08:20 **WELCOME** | Rainer Rothbauer | *Convergent Science*

08:40 **KEYNOTE** | MAHLE Jet Ignition as an Advanced Fuel Economy Solution
Hugh Blaxill | *MAHLE Powertrain, LLC*

09:20 Numerical Investigation of Natural Gas-Diesel Dual Fuel Combustion
Lorenzo Bartolucci | *University of Rome Tor Vergata*

09:40 Towards an Integrated Workflow to Model Liquid Spray Combustion Systems
Ricardo Novella | *CMT-Motores Térmicos*

10:00 CFD as Simulative Transparent Engine Diagnostic for GDI Spray Layout Optimization
Raghavan Lakshmanan | *Delphi Technologies*

10:20 Break

11:00 **ELSA Model Applied to Diesel and Gasoline Sprays Description** | Frederic Ravet | *Renault SAS*

11:20 Gasoline Spray Model Calibration Under Diesel Engine Like Conditions
Yohan Blacodon | *Aramco Overseas Company B.V.*

11:40 Leveraging CONVERGE for Modeling Adjacent Applications in the Automotive Industry
David Rowinski | *Convergent Science*

12:00 **SPONSOR** | Tecplot, Inc.

12:15 Lunch | *Nixe Palace II*

13:40 **KEYNOTE** | Progress on Chemical Kinetic Mechanism Development | Henry Curran | *NUI Galway*

14:20 Understanding Passive Turbulent Jet Ignition Concept for Automotive Applications
Josep Gómez Soriano | *CMT-Motores Térmicos*

14:40 Design Optimization of SI Engine Intake Ports | Aris Babajimopoulos | *Volvo Car Corporation*

15:00 An Innovative In-Cylinder Aerodynamics for High Efficiency SI Engines
Olivier Laget | *IFP Energies nouvelles*

15:20 Break

15:50 Combustion Stability Study in a Lean SI Optical Engine Using LES
Jacopo Zempi | *University of Perugia*

16:10 Large Eddy Simulation of Knocking Combustion
Max Mally | *RWTH Aachen University-Institute for Combustion Engines*

16:30 Effect of CNG-H2 Blends and Turbulence on EGR Tolerance in SI Engine
Prashant Goel | *Politecnico di Torino*

16:50 Modeling and Simulation of Ammonia Combustion in Spark Ignition Engines
Amer Avdic | *Opel*

17:10 Technical Achievements in Gas Turbine Engines | Scott Drennan | *Convergent Science*

17:30 **CLOSING** | *Convergent Science*

18:45 **NETWORKING** | Meet in the lobby for bus to Restaurant La Font de Prades-Museo Pablo Español

WEDNESDAY, 13 MARCH

ROOM ARENAS IV

08:00 Registration

08:30 **WELCOME** | *Convergent Science*

08:40 **KEYNOTE** | Simulation: Crucial Needs in the Automotive Industry | Frédéric Ravet | *Renault SAS*

09:20 Accelerating Design Exploration with Rescale's Cloud HPC Simulation Platform
Dan Jean | *Rescale*

09:40 Employing Machine Learning & Optimization Algorithms for Piston Bowl Design
Alaz Talay | *BMC Power*

10:00 Development of an Approach for the Optimization of Direct Injection CNG Engines
Vincenzo Bevilacqua | *Porsche Engineering Services GmbH*

10:20 Break

11:00 A Fast Running Chemistry Solver for Engine Combustion and Emissions Simulations
Andrea Matrisciano | *LOGE AB*

11:20 Numerical Assessment of an Innovative Piston Bowl in a Light-duty Diesel Engine
Andrea Bianco | *Powertech Engineering*

11:40 Validation Study for New Combustion Concept in Diesel Engine | Hyuckmo Kwon | *Hyundai Motor Co.*

12:00 **SPONSOR** | Rescale

12:15 Lunch | *Nixe Palace II*

13:40 Towards Quantitative Prediction of Urea Thermolysis in SCR Systems
Chaouki Habchi | *IFP Energies nouvelles*

14:00 On the Behaviour of Urea on a Heated Wall. A Revealed Leidenfrost-like Regime
Louis-Marie Malbec | *IFP Energies nouvelles*

14:20 Version 3.0 Updates and What Lies Beyond | Keith Richards | *Convergent Science*

14:40 **CLOSING** | Kelly Senecal | *Convergent Science*

15:20 **NETWORKING** | Meet in the lobby for bus to Karting Parcmotor Castellolí

TRAINING SCHEDULE

THURSDAY, 14 MARCH

TRAINING ROOM	SANTEMAR	SARAY	PRAGA	AGUAMAR
08:00	Advanced Topics in ICE Modeling	Introduction to CONVERGE 3.0 Input Files	Fluid-Structure Interaction Modeling	General Flow Modeling in CONVERGE
09:45	Break	Break	Break	Break
10:15	Advanced Topics in ICE Modeling continued	Turbulence Modeling	Optimization and Model Interrogation	General Flow Modeling in CONVERGE cont.
12:00	Lunch	Lunch	Lunch	Lunch
13:00	Tools for SAGE Detailed Chemistry	Spray Modeling	Advanced Surface Preparation Tools in CONVERGE Studio	General Flow Modeling in CONVERGE cont.
14:45	Break	Break	Break	Break
15:15-17:00	User-Defined Functions	Emissions Modeling	Personalized Case Setup Assistance	General Flow Modeling in CONVERGE cont.

FRIDAY, 15 MARCH

TRAINING ROOM	SANTEMAR	SARAY	PRAGA	AGUAMAR
08:00	Non-Premixed Combustion Modeling	Engine Aftertreatment Modeling	Conjugate Heat Transfer Modeling	Compressor and Pump Modeling
09:45	Break	Break	Break	Break
10:15	Premixed Combustion Modeling	Engine Aftertreatment Modeling continued	Conjugate Heat Transfer Modeling continued	Personalized Case Setup Assistance
12:00	Lunch	Lunch	Lunch	Lunch
13:00	Volume of Fluid Modeling	Gas Turbine Modeling in CONVERGE	Heat Transfer Mapping	Personalized Case Setup Assistance
14:45	Break	Break	Break	Break
15:15-17:00	CONVERGE + GT-SUITE Coupling	Getting Started with Tecplot for CONVERGE	Post-Processing Tools in CONVERGE Studio	Sealing

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The research institute **CMT - Motores Térmicos** is internationally well-known for its close collaboration with the automotive industry, centred on theoretical-experimental studies of thermo-fluid dynamic processes in internal combustion engines. Topics of interest comprise from the reduction of exhaust pollutant emissions to the improvement of engine efficiency and reliability.

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Research focuses on air management-turbocharging, injection-combustion, noise control, thermal management and engine control systems.

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