

International Conference on
LES for Internal Combustion Engine Flows



Final program

Thursday 18 November

8.15 Registration

9.00 Welcome address by X. Montagne, Associate Director (IFP Energies nouvelles, France)

Session 1 - Engine aerodynamics

Chairmen: Gilles Bruneaux (IFP Energies nouvelles, France) and Lyle Pickett (Sandia, USA)

9.15 Keynote address: **In-cycle structure and cycle to cycle variability of a tumbling flow. What can we learn from high speed PIV?**

J. Borée (Institut Pprime, France, in collaboration with Renault SAS)

9.50 **Development and validation of a new LES turbulence model for wall-bounded flows**

H. Baya Toda¹, K. Truffin¹, G. Bruneaux¹, O. Cabrit², F. Nicoud² (1 IFP Energies nouvelles, 2 i3M, France)

10.15 **Development and assessment of POD for analysis of turbulent flow in piston engines**

K. Liu, D. C. Haworth (Pennsylvania State Univ., USA)

10.40 **A strategy for evaluation of LES applied to diesel engine in-cylinder flow - joint effort of simulation and experimental PIV flow analysis**

E. Brußies¹, V. Neubert¹, G. Bittlinger¹, J. Janicka², A. Dreizler², W. Bauer³ (1 Robert Bosch, 2 TU Darmstadt, 3 ANSYS, Germany)

11.05 Break



- 11.30 LES of the flow in a DISI engine: analysis of turbulent scalar - velocity correlations**
F. di Mare¹, D. Goryntsev², J. Janicka² (1 DLR, 2 TU Darmstadt, Germany)
- 11.55 Characterisation of cyclic variability in an optically accessible IC engine by means of phase-independent POD**
B. Boehm¹, F. di Mare², A. Dreizler¹ (1 TU Darmstadt, 2 DLR, Germany)
- 12.20 A common engine platform for engine LES development and validation**
V. Sick¹, D. Reuss¹, C. Rutland², D. Haworth³, J. Oefelein⁴, J. Janicka⁵, T.-W. Kuo⁵, X. Yang⁵, M. Freitag⁶ (1 Univ. of Michigan, 2 Univ. of Wisconsin, 3 Pennsylvania State Univ., 4 Sandia National Lab., USA; 5 TU Darmstadt, Germany; 6 General Motors, USA)

12.45 Lunch

Session 2 - Engine combustion

Chairmen: Sébastien Candel (École Centrale Paris, France) and Dan Haworth (Pennsylvania State Univ., USA)

- 14.15 Keynote address: Numerical experiments using DNS of turbulent flames at high Reynolds numbers**
D. Thévenin (Univ. of Magdeburg, Germany)
- 14.50 LES of a growing turbulent premixed flame kernel using a dynamic flame surface density model**
G. Wang¹, M. Boileau¹, D. Veynante¹, K. Truffin² (1 École Centrale Paris, 2 IFP Energies nouvelles, France)
- 15.15 LES of a spark-ignition engine using different combustion models**
F. Magagnato (Univ. Karlsruhe, Germany)
- 15.40 Evolutions of the ECFM-LES model for premixed combustion and applications to spark-ignited engines**
K. Truffin, S. Richard, O. Colin, O. Laget, B. Réveillé (IFP Energies nouvelles, France)
- 16.05 Break
- 16.30 LES of turbulent combustion in a spark assisted homogenous charge compression ignition engine**
T. Joelsson, R. Yu, X.-S. Bai (Lund Univ., Sweden)
- 16.55 Using LES to quantify and analyse cycle-to-cycle variability in spark-ignition engine**
V. Granet^{1,2}, B. Enaux^{1,3}, O. Vermorel¹, V. Dugue², L. Thobois³, T. Poinot⁴ (1 CERFACS, 2 Renault SAS, 3 PSA Peugeot Citroën, 4 Institut de Mécanique des Fluides de Toulouse, France)
- 17.20 Development of chemical kinetics tabulation method for the prediction of diesel engine pollutants**
D.-E. Tudorache^{1,2}, P. Auzillon¹, L. Thobois², N. Darabiha¹, R. Vicquelin¹, O. Gicquel¹, B. Fiorina¹ (1 École Centrale Paris, 2 PSA Peugeot Citroën, France)
- 17.45 A LES-CMC method for the numerical simulation of diesel engine combustion**
F. Bottone¹, A. Kronenburg², D. Gosman¹, A.-J. Marquis¹ (1 Imperial College London, UK; 2 ITV Stuttgart, Germany)
- 18.15 Cocktail
- 19.45 Bus departure to the meeting point in Paris

Friday 19 November

Session 3 - LES modelling of sprays

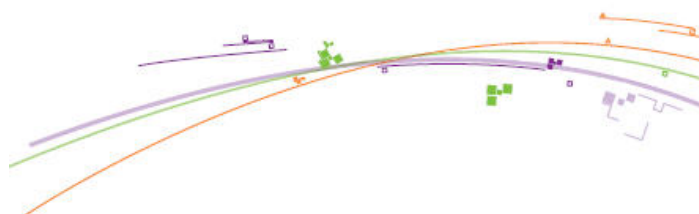
Chairmen: Bizhan Befrui (Delphi, Luxemburg) and Chawki Habchi (IFP Energies nouvelles, France)

- 9.00 Keynote address: **Stochastic models of atomizing sprays; coupling with LES**
M. Gorokhovski (École Centrale Lyon, France)
- 9.35 **Numerical study of primary break-up of liquid jets: LES and instability analysis**
S.-K. Kannan, B. Peters (Univ. of Luxemburg, Luxemburg)
- 10.00 **Scalar dissipation rate and spray source term modelling for IC Engine LES**
C. Rutland (Univ. of Wisconsin, USA)
- 10.25 Break
- 10.55 **LES predictions of the vortical flow structures in diesel injector nozzles**
M. Gavaises, A. Theodorakakos, D. Papoulias (City Univ. London, UK)
- 11.20 **Eulerian-Eulerian and Eulerian-Lagrangian LES of diesel sprays**
L. Martinez, A. Vié, C. Habchi (IFP Energies nouvelles, France)
- 11.45 **Comparison of diesel spray combustion in different high-temperature, high-pressure facilities**
L. M. Pickett¹, C. L. Genzale¹, G. Bruneaux², L.-M. Malbec², L. Hermant², C. Christiansen³ (1 Sandia National Lab., USA; 2 IFP Energies nouvelles, France; 3 TU Denmark, Denmark)
- 12.10 Lunch

Session 4 - Applying LES to engine sprays

Chairman: Chris Rutland (Univ. of Wisconsin, USA)

- 13.40 Keynote address: **The role of unsteadiness and coherent structures in the internal flow of automotive injectors: LES improving the understanding of the atomisation generation**
J. Hélie (Continental, France)
- 14.15 **LES of fuel injection nozzles in cold start conditions**
R. Payri, F.-J. Salvador, J. Gimeno, G. Bracho (CMT, Spain)
- 14.40 **LES and optical studies of GDI pulsed liquid jets**
B. Befrui, G. Corbinelli (Delphi, Luxemburg)
- 15.05 Closing address by C. Angelberger, Scientific correspondent (IFP Energies nouvelles, France)
- 15.30 Bus departure to Rueil-Malmaison RER station (connections to the airports and the railway stations)



Poster session

Posters are displayed throughout the two-days conference

- **Reliable prediction of particle dispersion with LES**
D. Dimitrova¹, M. Braun², A. Sadiki¹, J. Janicka¹ (1 TU Darmstadt, 2 ANSYS, Germany)
- **CaMPaS Multi-cycle LES of a 4 Cycl. SI engine using AVBP on a parallel supercomputer**
A research project coordinated by IFP Energies nouvelles with CERFACS, the EM2C laboratory and CINES, with support from PSA Peugeot Citroën
- **Large-Eddy Simulation of an auto-igniting liquid Diesel-type spray**
J. Tillou^{1,2}, C. Angelberger¹, D. Veynante², J.-B. Michel¹, A. Robert¹, S. Richard¹, L. Martinez¹ (1 IFP Energies nouvelles, 2 École Centrale Paris, France)

