



LES for Internal Combustion Engine Flows (LES4ICE)

Rueil-Malmaison, France ■ 30 November – 1 December 2016

Wednesday 30 November

- 8.00 Registration
- 9.00 Welcome Address
X. Longaygue, Scientific Division (IFPEN, France)
- Opening of the conference
C. Angelberger, Scientific correspondent of LES4ICE (IFPEN, France)
- 9.10 Keynote Lecture by Dr. **T. Poinso** (IMFT and CERFACS, France)
Numerical requirements and validations for LES of combustion: application to gas turbines

SESSION 1: LES modeling and numerical methods

Chairpersons: A. Dadamo (Unimore, Italy) and K. Truffin (IFPEN, France)

- 09.50 Investigation of numerical effects on the prediction of flame propagation in Large Eddy Simulations
T. Nguyen, A. Kempf (Univ. of Duisburg-Essen, Germany)
- 10.15 A no-slip wall law formulation for cell-vertex codes, validated for LES of internal aerodynamics
E. Nicoud, O. Colin, C. Angelberger (IFPEN, France), F. Nicollet, C. Krüger (Daimler AG, Germany)
- 10.40 Break
- 11.10 Development of IC engine simulation platform based on compressible LES and immersed boundary method
T. Nambu, Y. Mizobuchi and Y. Matsuo (JAXA, Japan), Y. Morii (JAEA, Japan), M. Hishida, S. Yasuda, H. Yao (Ryoyu Systems, Japan)
- 11.35 Assessment of hybrid URANS/LES turbulence modeling for ICE flow simulation: a ZDES study
V.K. Krastev (Univ. of Tuscia, Italy), F. Piscaglia (PoliMi, Italy), G. Bella (Univ. Tor Vergata, Italy)
- 12.00 An adaptive filtering technique for scale-resolving turbulence modeling of in-cylinder flow
F. Piscaglia, A. Montorfano, A. Onorati (PoliMi, Italy)
- 12.25 Lunch

- 13.55 Interactions between numerics and SGS modelling for the LES of a Diesel-like spray
J. Zowczak, C. Angelberger, J-B. Michel (IFPEN, France), D. Veynante (CNRS, France)
- 14.20 Proposal for defining reference test cases for evaluating the ability of numerical schemes for LES
C. Angelberger (IFPEN, France)

SESSION 2: Piston engine aerodynamics

Chairpersons: V. Sick (Univ. of Michigan, USA) and S. Jay (IFPEN, France)

- 14.30 A comparative investigation of the numerical treatment of intake and exhaust ports and their impact on in-cylinder cycle-to-cycle variations
S. Buhl, D. Hain, F. Hartmann, C. Hasse (TU Freiberg, Germany)
- 14.55 Analysis of turbulent statistical theory quantities and instantaneous turbulence within a piston engine
B. Peterson (Univ. of Edinburgh, UK), F. Zentgraf, E. Baum, A. Dreizler, B. Böhm (TU Darmstadt, Germany)
- 15.20 Break
- 15.40 Towards direct numerical simulation of realistic ICE geometries: flow in the intake pipe of the TCC-III engine test bench
G.K. Giannakopoulos¹, C.E. Frouzakis¹, P.F. Fischer^{2,3}, A.G. Tomboulides^{3,4}, K. Boulouchos¹ (1 ETH Zürich, Switzerland, 2 Univ. of Illinois, USA, 3 Argonne National Laboratory, USA, 4 Aristotle Univ. of Thessaloniki, Greece)
- 16.05 Correlation of CCV between In-cylinder swirl ratio and net polar radial velocity in valve seat region using LES under motored engine condition
X. Yang, T. Kuo (GM R&D, USA)
- 16.30 Experimental and numerical investigations of cyclic variations of in-cylinder flow with high speed dual plane PIV and LES
F. Nicollet, C. Krüger (Daimler AG, Germany), E. Nicoud, O. Colin, C. Angelberger (IFPEN, France), J. Bode, B. Böhm (TU Darmstadt, Germany)
- 16.40 Break
- 17.00 Estimate of turbulent characteristics of in-cylinder flow field during transient in Spark-Ignition Direct Injection Engine
M. Sadeghi, B. Moreau, F. Lespinasse, F. Foucher, C. Mounaim-Rousselle (Univ. Orléans, France)
- 17.25 Investigation of the flow through the intake port of an IC engine using high-resolution LES and PIV measurements
F. Hartmann¹, S. Buhl¹, L. Winking², C. Hasse¹, S.A. Kaiser² (1 TU Freiberg, Germany, 2 Univ. Duisburg-Essen, Germany)
- 17.50 LES of internal combustion engine flows using cartesian overset grids
T. Falkenstein¹, S. Kang², M. Davidovic¹, M. Bode¹, H. Pitsch¹ (1 Univ. of Aachen, Germany, 2 Sogang Univ., Korea)
- 18.15 Bus transfer to the restaurant “*La Gare*” in Paris
- 19.15 Dinner
- 21.45 Bus transfer from the Restaurant “*La Gare*” to *Place Charles de Gaulle Etoile* in Paris then to the hotels in Rueil-Malmaison

Thursday 1 December

8.00 Registration

8.30 Keynote Lecture by Prof. **M. Gavaises** (City Univ. of London, UK)
The importance of turbulence models in cavitating injector flows

SESSION 3: Injector flows and sprays

Chairpersons: Y.M. Wright (ETH, Zürich, Switzerland) and C. Habchi (IFPEN, France)

- 9.10 X-Ray diagnostics for spray model validation
C. F. Powell, D. J. Duke, K. E. Matusik, A. B. Swantek, A. L. Kastengren (Argonne National Lab., USA)
- 09.35 Study of nozzle design impact on spray formation in diesel injection using high-resolution Large-Eddy Simulation
P.L. Aguado, J. Shi, G. Dober, N. Guerrassi (Delphi, Luxembourg), W. Bauer (ANSYS, Germany)
- 10.00 Volume-of-fluid simulation of gasoline injectors with topologically changing mesh
A. Montorfano, F. Giussani, F. Piscaglia, A. Onorati (PoliMi, Italy), J. Hélié (Continental, France)
- 10.25 Break
- 10.55 Large-Eddy Simulation of sprays: application to a high pressure fuel injector
P. Chausserie-Laprée, J. Hélié (Continental, France), J. Changzhao (Loughborough Univ., UK), F-X. Demoulin (CORIA, France)
- 11.20 LES of inner nozzle flow and primary breakup under flashing conditions in gasoline direct injection systems
M. Schmitt, A. Christ, E. Knudsen, V. Mittal (Bosch, Germany and USA)
- 11.45 LES of direct gas injection in internal combustion engines
A.Y. Deshmukh, D. Mayer, M. Bode, T. Falkenstein, H. Pitsch (Univ. Aachen, Germany), M. Khosravi (Ford, Germany), T. van Overbrüggen (Univ. Aachen, Germany)
- 12.10 Lunch
- 13.40 LES of n-dodecane spray combustion and pollutant formation using a multiple RIF model
M. Davidovic, M. Bode, T. Falkenstein, L. Cai, H. Pitsch (Univ. Aachen, Germany)
- 14.05 Numerical simulations of ECN "Spray A" split injection using LES-CMC
L. Zeugin, C.K. Blomberg, M. Bolla, K. Boulouchos and Y.M. Wright (ETH Zürich, Switzerland)

SESSION 4: SI engine combustion

Chairpersons: D. Veynante (CNRS, France) and O. Colin (IFPEN, France)

- 14.30 An experimental and simulation study of early flame development in a homogeneous-charge SI engine
Y. Shekhawat, D.C. Haworth (PennState Univ., USA), A. d'Adamo, S. Fontanesi (Unimore, Italy), P. Schiffmann, D.L. Reuss, V. Sick (Univ. Michigan, USA)
- 14.55 Break

- 15.25 Numerical investigation of the influence of different valve seat geometries on the in-cylinder flow and combustion in SIE
P. Janas (Univ. Duisburg-Essen, Germany), U. Allauddin, M. Pfitzner (Univ. Armed Forces Munich, Germany), B. Böhm (TU Darmstadt, Germany), A. Kempf (Univ. Duisburg-Essen, Germany)
- 15.50 LES analysis of knock in a direct injection spark ignition engine
A. Robert¹, K. Truffin¹, N. Iafrate¹, O. Colin¹, B. Enaux², S. Jay¹, C. Angelberger¹ (1 IFPEN, 2 PSA Group, France)
- 16.15 Understanding the influences of thermal and mixture inhomogeneities on the auto-ignition process in a CAI engine using LES
E. Yildar¹, G. Kuenne¹, C. He¹, R. Schießl², M-S. Benzinger², F. di Mare^{1,3}, A. Sadiki¹, J. Janicka¹ (1 TU Darmstadt, Germany, 2-KIT, Germany, 3 DLR, Germany)
- 16.40 Large-Eddy Simulation of auto-ignition in internal combustion engines: diesel and gasoline case
Z. Pavlovic, B. Basara, P. Priesching (AVL, Slovenia and Austria)
- 17.05 Closing remarks
C. Angelberger (IFPEN, France)
- 17.10 End of the presentations