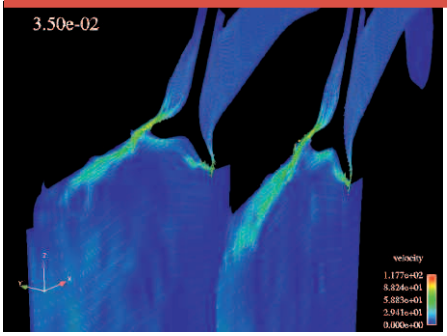
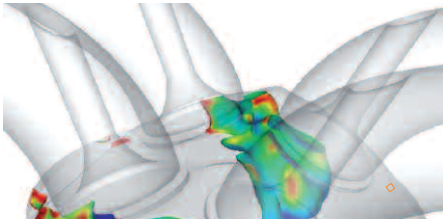
IFP Sessions

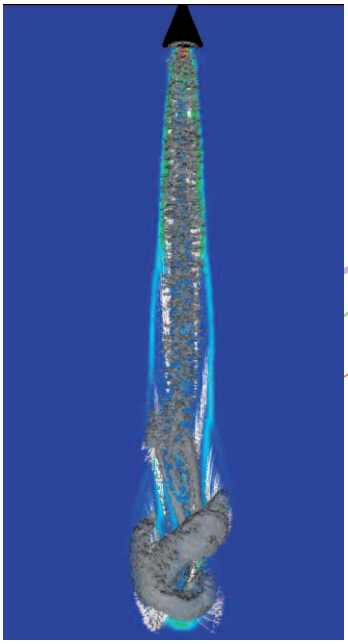
IFP, Rueil-Malmaison, France | 1 - 2 December 2008

LES
for Internal Combustion Engine Flows

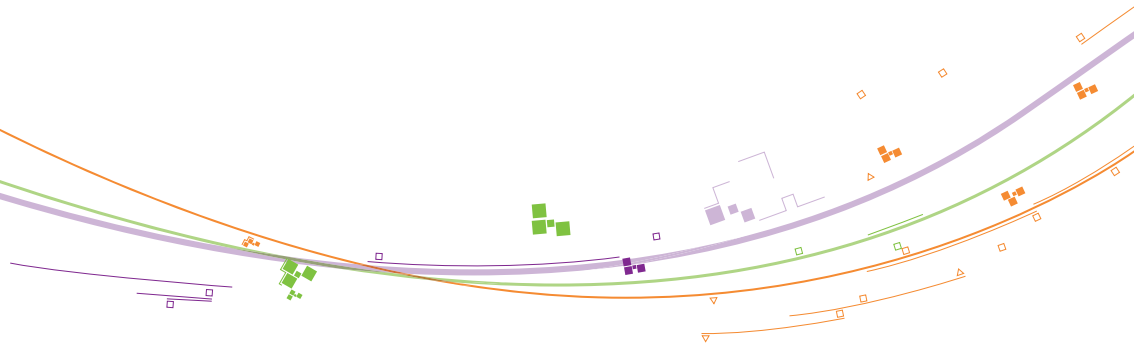




Second Announcement



Innovation
Energy
Environment



Context

The LES for Internal Combustion Engine Flows (LES4ICE) conference aims at providing a forum for exchanges concerning recent advances in research on and the use of Large-Eddy Simulation (LES) applied to internal combustion engine (ICE) flows, injection and combustion. The aim is to bring together engine designers and players in LES research worldwide and have them compare views on the state of the art in LES applied to ICEs and on the bottlenecks future research will have to overcome to pave the way to practical use of LES in the piston engine design process.

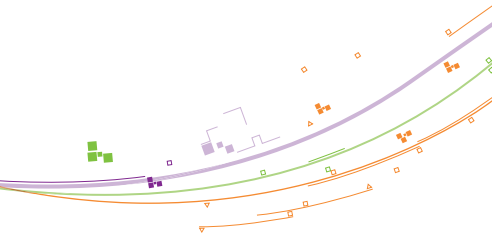
LES has become a topic of central interest in Computational Fluid Dynamics (CFD) applied to turbulent flows. This reflects its potential to bridge the gap between the classical Reynolds Averaged Navier - Stokes (RANS) approach - which gives access to an ensemble average by modelling the whole turbulent spectrum - and Direct Numerical Simulation (DNS) - which resolves the whole spectrum of flow scales without any turbulence modelling. LES is aimed at resolving the large instantaneous flow scales that depend directly on the geometry studied and modelling only the small scales whose structure can be assumed universal.

LES opens up new prospects for the use of CFD in the piston engine design process. It can be expected to definitively improve the description of engine aerodynamics, because the steady growth of computing power will make it possible to resolve the essential part of the flow energy in LES, yielding increasingly reliable results. In the next 10 years, this opens up the prospect of using LES for numerical investigations of engine aerodynamics capable of yielding reliable quantitative results that could potentially further reduce development times and costs for new concepts.

Concerning liquid injection, mixing and combustion in piston engines, many phenomena will not be resolvable on meshes small enough to be practical, and LES predictions will therefore depend on the quality of sub-grid-scale models. Even so, given that the major input to these models – local turbulence conditions – is accurately predicted in LES, one can reasonably envisage increased levels of predictivity. This is all the more true in that model formulation for LES involves instantaneous local phenomena, which are more easily addressed in a general way than the multi-scale statistical phenomena addressed in RANS models, which can not distinguish turbulence, intermittency and cyclic variations.

Objectives

By construction, LES will be able to address phenomena not accessible to standard CFD methods, such as cyclic variability, misfires, knock and rumble, fast transients and cold starts, making it possible to deepen our understanding of and to master engine combustion in realistic operating conditions. In the medium to long term, advances in computing power and in the codes to use it could make LES the core of a virtual engine test bench capable of predicting the real-world operation of a new ICE concept before it is actually built. But there are many open questions, ranging from basic modelling, through the appropriate numerical methods, to methodology and CPU time issues, that will have to be answered before LES can attain its full potential in ICE simulation and design. It is the goal of the LES4ICE conference to provide a unique opportunity to keep up with the relevant R&D.



Contacts

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What is IFP?

IFP is a world-class public-sector research and training center, aimed at developing the technologies and materials of the future in fields of energy, transport and the environment. It provides public players and industry with innovative solutions for a smooth transition to the energies and materials of tomorrow – more efficient, more economical, cleaner and sustainable. To fulfill its mission, IFP has five complementary strategic priorities:

- capturing and storing CO_2 to combat the greenhouse effect,
- diversifying fuel sources,
- developing clean, fuel-efficient vehicles,
- converting as much raw material as possible into energy for transport,
- pushing back the boundaries in oil and gas exploration and production.

An integral part of IFP, its graduate engineering school prepares future generations to take up these challenges.

For more information on IFP,
http://www.ifp.com

Presentation of the programme

Oral Presentations: the program will include:
- Keynote presentations (35 minutes including 5 minutes discussion)
- Oral presentations (25 minutes including 5 minutes discussion)

Official Language
English will be the official language. Simultaneous interpretation will not be provided.

Programme

Monday 1 December 2008

8:15 Registration

9:00 **Welcome address**

Session I: Engine aerodynamics

9:15 Keynote: **D. Haworth,** *Pennsylvania State University, USA*
Applications of LES to in-cylinder processes in IC engines: a review

9:50 **Toward the use of LES in industrial applications**
G.-M. Bianchi*, F. Brusiani*, T. Baritaud°, A. Bianchi d'Espinosa° - **University of Bologna, °Ferrari, Italy*

10:15 **Scale adaptive simulations for IC engine applications**
M. Kuntz, F. Menter, W. Bauer, R. Lechner - *ANSYS, Germany*

10:40 Coffee break

11:10 **Visualisation and quantification of the turbulence structures induced by a gasoline DI port**
O. Imberdis*, M. Hartmann*, H. P. Bensler*, D. Thévenin** - **Volkswagen AG **Otto-von-Guericke-Universität - Magdeburg, Germany*

11:35 **Analysis of a valve jet using Large Eddy Simulation and time-resolved PIV**
Y. Laurant*°, G. Slama*, P. Rey*, A. Dupont*, M. Michard° - **Renault, °LMFA, INSA de Lyon, France*

12:00 **Large-Eddy Simulation study of IC engine processes using immersed boundary technique**
S. Shashank, H. Pitsch - *Stanford University, USA*

12:25 Lunch

Session II: Liquid fuel injection

14:00 Keynote: **P. Adomeit**, *FEV Motorentechnick, Germany*
Application of LES to direct injection gasoline engines

14:35 **Towards LES of liquid atomization**
J. Chesnel**, J. Réveillon*, F.-X. Demoulin*, T. Ménard* - **Université de Rouen, **CORIA and Renault, France*

15:00 **LES of fuel injection in an euler/euler framework: application to diesel and gasoline injections**
A. Vié*, M. Martinez*, A. Benkenida*, B. Cuenot** - **IFP, **CERFACS, France*

15:25 Coffee break

15:55 **Application of LES and optical methods to high-pressure GDI conical spray atomization**
B. Befrui, G. Corbinelli, W. Reckers - *Delphi Customer Technology Centre G.D, Luxembourg*

16:20 **Large-Eddy Simulation of fuel injection in a swirling/non-swirling diesel environment**
X. Jiang, K. Jagus, H. Zhao - *Brunel University, United Kingdom*

16:45 **Effect of cycle to-cycle variations on air-fuel mixing in a realistic DISI IC-engine using LES**
D. Goryntsev, A. Sadiki, M. Klein, J. Janicka - *TU-Darmstadt, Germany*

17:30 Bus departure to the dinner with s sightseeing tour in Paris

Dinner

Tuesday 2 December 2008

Session III: Engine combustion

09:00 Keynote: **C. Rutland,** U. Wisconsin-Madison, USA
LES modeling issues for direct injection IC engines

09:35 **Applications of Large-Eddy Simulation for diesel spray flame using KIVA-LES with flamelet approach**
T. Hori, H. Tanaka, K. Irie, J. Senda, H. Fujimoto - *Doshisha University, Japan*

10:00 **A coupled LES-DNS study of physicochemical processes in the near field of transient jets under engine conditions**
R. Venugopal, V. Magi, J. Abraham - *Purdue University, USA*

10:25 Coffee break

10:55 **Large-Eddy Simulation of ethanol/air combustion in HCCI engines**
T. Joelsson, R.Yu, X.S. Bai - *Lund University, Sweden*

11:20 **Toward high-fidelity simulations for clean and efficient combustion of alternative fuels**
J.C. Oefelein - *Sandia National Laboratories, USA*

11:45 **Multi-cycle LES of a spark-ignited engine with full intake and exhaust systems: methodology and modelling issues**
B. Enaux*°, O. Vermorel*, L. Thobois°, T. Poinsot** - **CERFACS, °PSA Peugeot Citroën, **IMFT, France*

12:10 Lunch

Session IV: LES and experimental techniques

13:40 Keynote: **P. Trouillet**, *PSA Peugeot-Citroën, France*
LES for automotive industry: current use and expectations

14:15 **Towards planar laser combustion diagnostics at kHz-repetition rates**
B. Böhm, C. Kittler, R. Gordon, A. Dreizler - *TU Darmstadt Germany*

14:40 **An experimental database dedicated to the development and validation of a LES methodology for predicting cyclic variations in SI engines**
C. Lacour, C. Pera, C. Angelberger, G. Parameswaran - *IFP, France*

15:05 Round table and closing session

16:00 Bus departure to the RER Station of Rueil-Malmaison

General Information

Venue and date

The LES4ICE conference will be held at IFP in Rueil-Malmaison, France, on Monday 1 and Tuesday 2 December 2008.

Visa

Visitors from certain countries outside the European Union need a visa to enter France and should contact the French Embassy or Consulate in the country of residence. A letter of confirmation of the visitors participation will be sent to you upon receipt of the registration form and can be used for the visa application.

Lunches and official dinner

IFP will welcome you in its lounges for the lunches. There will be an official dinner on Monday 1 December evening.

Web site

For more information: http://www.ifp.com heading "Events".

Shuttle bus

A free shuttle bus service will be organized:
- on both days between the meeting point in Paris and IFP,
- on 1 December evening for the dinner attendees.

Further information will be given to you in the letter of acknowledgement.

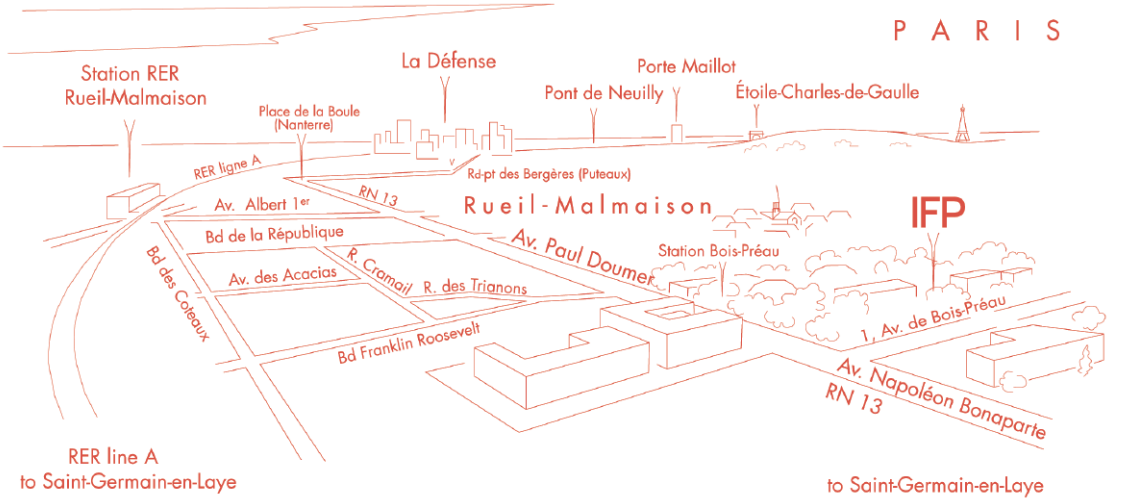
Partnership

This conference is an opportunity for sponsors to communicate and advertise. For further information, contact: bettina.caruso@ifp.fr

Access

■ By car: from Paris, Porte Maillot exit, RN13, direction La Défense - Saint-Germain-en-Laye

■ Using public transport by RER: Line A direction Saint-Germain-en-Laye
- get off at Rueil-Malmaison, Victor Hugo exit, take the 244 bus and get off at "Geneniève Couturier",
- or get off the RER at Grande Arche de la Défense, take the 258 bus (Direction Saint-Germain-en-Laye) and get off at "Bois-Préau".



Registration

Registration fees

Before 19 October 2008

- Industrial companies: 600€ (V.A.T. included)
- University members and students: 450€ (V.A.T. included)

After 19 October 2008

- Industrial companies: 700€ (V.A.T. included)
- University members and students: 550€ (V.A.T. included)

Registration fees will cover conference participation, coffee breaks and lunches, the conference dinner on the evenig of 1 December, the book of abstracts and the CD containing the presentations which will be sent to you after the conference.
Upon receipt of the registration form and the relevant payment, the administrative secretariat will send each participant a letter of acknowledgement and information about the seminar.

Registration

To register please return the enclosed registration form, duly completed, before **14 November 2008,** to:

The Administrative Secretariat
Frédéric Tourde
FC_2 - Energy Park – Bât 6
132-190 boulevard de Verdun
92413 Courbevoie Cedex - France
Tel.: +33 1 49 04 42 51
Fax: +33 1 49 04 42 43
E-mail: f.tourde@fc2.fr

You can also register directly via the IFP web site: http://www.ifp.com heading "Events".

To be accepted, the registration must be accompanied by the full payment.

Payment

All fees are payable in Euros only:

- By check made out to FC2 in Euros only

- By wire transfer to the bank:
BNP PARIBAS, Montparnasse Paris Sud Entrepris (00274)
IBAN: FR76 3000 4016 9900 0100 3574 108
BIC: BNPAFRPPPXV
Account owner: FC2

- By credit card (CB, Visa, Mastercard, American Express). Due to bank charges, commission fees will be applied to credit card payments.

Cancellation conditions

All cancellations must be notified in writing to FC_2.

- **before 14 November 2008:** total refund less 85 € for administrative fees.

- **after 14 November 2008:** no refund.

Accommodation

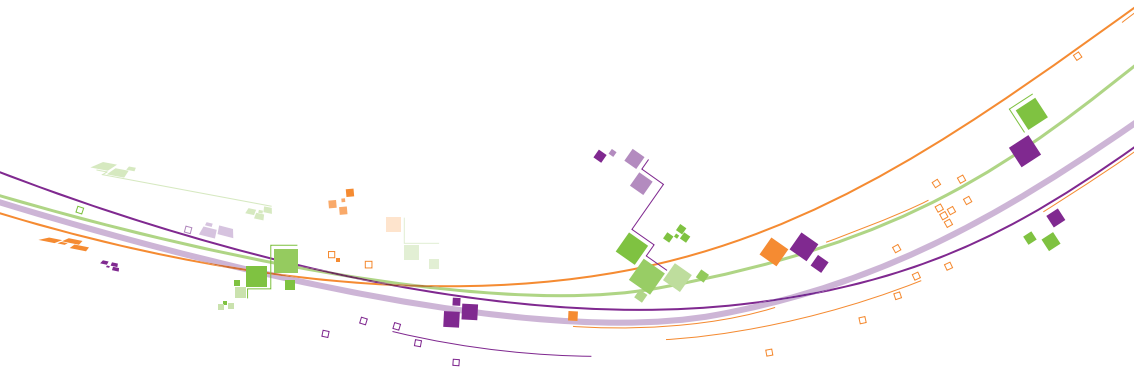
Participants are responsible for their hotel accommodation.
As Paris is very busy at this time of the year, early booking is strongly recommended.
You will find hereafter a list of hotels that we recommend.

Hotels in Rueil-Malmaison

HOTELS	ADDRESS	TEL	FAX
LA CHAUMIERE***	20 avenue Albert 1er 92500 Rueil-Malmaison	+33 (0) 1 47 32 20 92	+33 (0) 1 47 49 69 87
IBIS***	16 boulevard de l'Hôpital Stell 92500 Rueil-Malmaison	+33 (0) 1 47 32 96 96	+33 (0) 1 47 49 01 90
LES ARTS***	3 rue du Maréchal Joffre 92500 Rueil-Malmaison	+33 (0) 1 47 52 15 00	+33 (0) 1 47 14 90 19

Hotels in Paris

HOTELS	ADDRESS	TEL	FAX
BALMORAL***	6 rue du General Lanrezac 75016 Paris	+33 (0) 1 43 80 30 50	+33 (0) 1 43 80 51 56
FERTEL ETOILE***	4 rue des Acacias 75017 Paris	+33 (0) 1 47 66 77 75	+33 (0) 1 47 66 47 90
STELLA***	20 av Carnot 75017 Paris	+33 (0) 1 43 80 84 50	+33 (0) 1 47 66 01 94
PHOENIX**	5 rue du Général Lanrezac 75017 Paris	+33 (0) 1 44 09 05 05	+33 (0) 1 44 09 01 21
TROYON**	10 rue Troyon 75017 Paris	+33 (0) 1 43 80 14 09	+33 (0) 1 43 80 23 54
MAC MAHON***	3 av Mac Mahon 75017 Paris	+33 (0) 1 43 80 23 00	+33 (0) 1 43 80 74 00
STAR ETOILE HOTEL***	18 rue de l'Arc de Triomphe 75017 Paris	+33 (0) 1 43 80 27 69	+33 (0) 1 40 54 94 84



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