

September 14th~17th, 2010

VALENCIA (SPAIN)

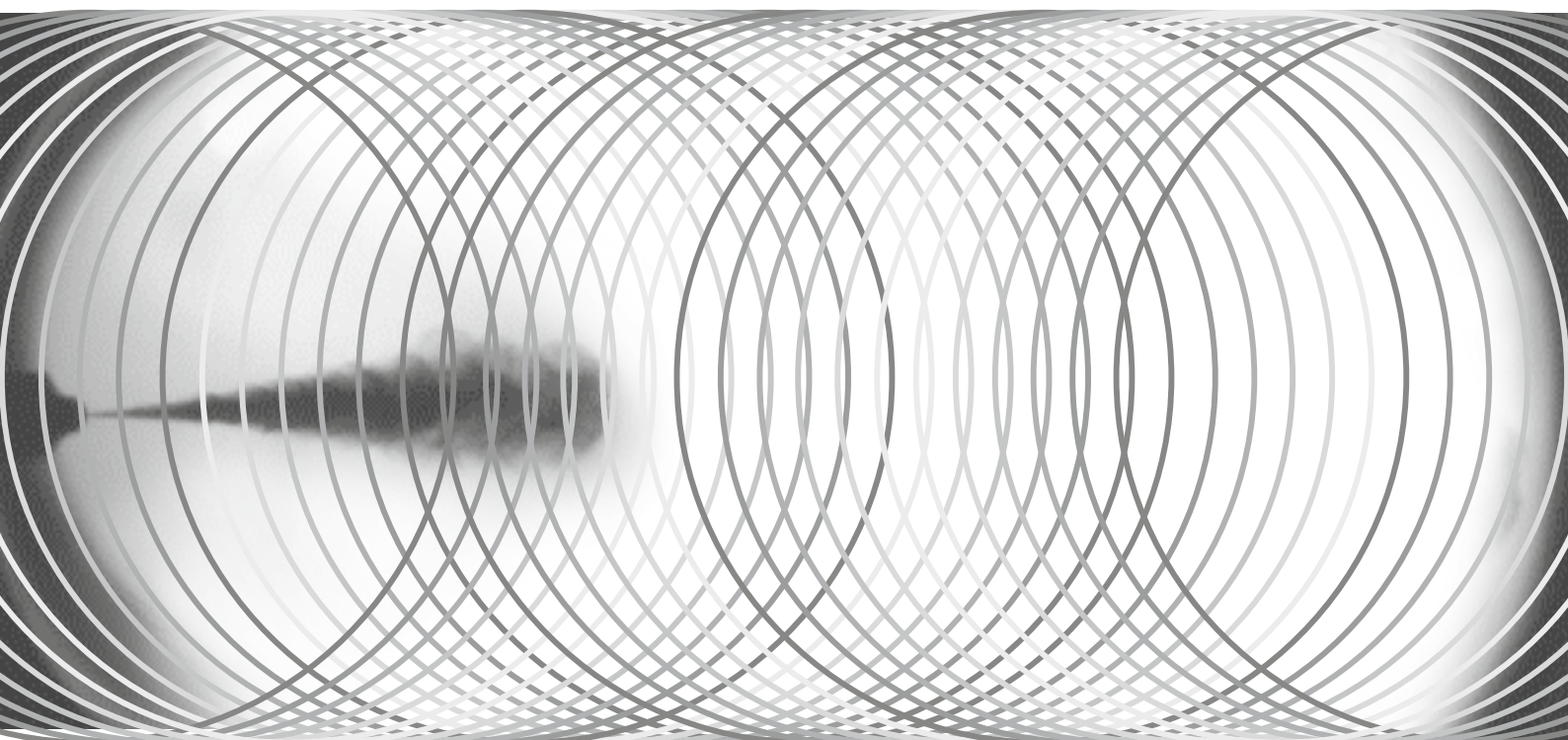


THIESEL·2010 conference on:

Thermo-and fluid dynamic **processes in** Diesel Engines



UNIVERSIDAD
POLITECNICA
DE VALENCIA





Bienvenida Welcome

Una vez más, un año más, La Universidad Politécnica de Valencia acoge la conferencia THIESEL sobre Procesos Termofluidodinámicos en motores Diesel. Esta es la 6ª edición, con lo que se puede asegurar que el proyecto está consolidado y aparece como cita obligada en el calendario internacional de encuentros científicos sobre motores Diesel.

Cada edición ha mostrado una particularidad, y en este caso, ha sido en primer lugar los acontecimientos económicos y financieros que han afectado de forma especial al sector de automoción. Y por otra parte la aparición de un contexto que parece favorecer la implantación de la tracción eléctrica en los turismos.

Con todo ello, los que estamos en este sector, seguimos pensando que los motores térmicos, y en particular el motor Diesel aún tienen mucho camino por recorrer, y buena prueba de ello es la variedad de ideas y novedades que se reflejan en las ponencias de este congreso.

Así pues consideramos un verdadero honor ser una vez más los anfitriones de la Conferencia Thiesel en su edición 2010, y estamos convencidos que el interés de los temas abordados estimulará las discusiones entre sus participantes, contribuyendo a la mejora y al desarrollo de los motores Diesel.

Sean pues bienvenidos, y siéntanse acogidos por esta ciudad y esta universidad que estoy seguro les proporcionarán un ambiente de trabajo agradable y prolífico ■

Prof. JUAN JULIÁ

■ Rector de la Universidad Politécnica de Valencia ■

Once more, this year again, the Universidad Politécnica de Valencia is hosting the THIESEL Conference on Thermo- and Fluid Dynamic Processes in Diesel Engines. This is its 6th edition, which confirms that it is by now a well consolidated project. It has also become a must in the international calendar of scientific meetings about Diesel engines.

Each of the editions has had its own particularity. This one will be marked on the one hand by the economical and financial events that have especially affected the automotive sector, and on the other hand, by the new trend that favours the implementation of the electrical powertrain in light-duty vehicles.

All things considered, we who work in this sector, still believe that thermal engines, and in particular Diesel engines, have yet plenty of kilometres to travel. The variety of ideas and novelties reflected in the papers of this conference clearly prove our point.

It is therefore a real honour for us to be again the hosts of this Conference edition, THIESEL 2010, and we are convinced that the interest of the subjects treated will stimulate many discussions between its participants, thus contributing to the improvement and development of the Diesel engines.

Be welcome, and feel welcome by this city and this university, which are willing to offer you a pleasant and prolific working environment ■

■ Rector of the Universidad Politécnica de Valencia ■

Objectives

The THIESEL Conference on 'Thermo-and Fluid Dynamic Processes in Diesel Engines' has achieved a remarkable position as a meeting point between industry, research institutions and academia involved in the Diesel automotive sector. The international attendance has grown steadily since its first edition in 2000, thus indicating that there is a real need for such a gathering. Even though considerable efforts are being devoted to the development of new solutions, based on hydrogen and fuel cell technologies, it is likely that the internal combustion engine will remain the main propulsion system for vehicles in the next 20 to 30 years and beyond. Therefore, research oriented at reducing pollutant emissions from internal combustion engines, and especially from Diesel engines, is necessary if compliance with the strict current and future regulations regarding emission levels is to be achieved. A combination of new technology and

new fuels is needed to reach the near zero emission level targets aimed at. New generation engines will have to consume less, and be significantly more efficient and silent. The development of advanced control strategies should provide the flexibility required to make the most of modern multiple injection systems, so that the combustion process may be optimized. In addition, the application of the homogeneous charge compression ignition (HCCI) concept should represent a step towards significant reduction of NOx emissions in the part load range. To further reduce emissions and fuel consumption, variable control systems for the exhaust gas recirculation (EGR) and the turbo-charging will have to be developed. Considerable effort is being put in understanding the combustion noise, so that it may be reduced especially at critical operating conditions. The research in these areas benefits from the most recent advances in experimental

diagnosis tools and electronic control units, as well as from the continuing effort to improve CFD predictions. The clean and silent Diesel engine technology has real potential. However, it can only succeed if the academic researchers become more conscious of the automotive industrial needs and if the automotive industry is willing to invest in basic research leading to long-term solutions.

THIESEL 2010, the sixth edition of this two-yearly conference, aims at gathering good quality papers describing the most recent developments and latest innovations relative to thermo-and fluid dynamic processes in Diesel engines. And, just as important is its philosophy to bring together ideas from both Industry and Academia, because the success of a clean and silent Diesel engine clearly depends on the close co-operation between the automotive industry and its University partners ■

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Dr. B. VAGLIECO | Istituto Motori (Italy) |
Dr. T. WINTRICH | Robert Bosch (Germany) |

Session matrix

	Tuesday, September 14 th	Wednesday, September 15 th	Thursday, September 16 th	Friday, September 17 th
07:30 - 08:30		CONFERENCE REGISTRATION		
08:30 - 10:30		SESSION A.1. Fuel Injection & Sprays (I)	SESSION C.1. Combustion (I)	SESSION E.1. Emissions & Aftertreatment
10:30 - 11:00		COFFEE BREAK		
11:00 - 13:00		SESSION A.2. Fuel Injection & Sprays (II)	SESSION C.2. Combustion (II)	SESSION E.2. Air Management & Turbocharging
13:00 - 15:30		LUNCH		
15:30 - 17:00		SESSION B.1. Diesel Engine Modelling (I)	SESSION D.1. Experimental Methodologies	SESSION F.1. New Concepts & Engine Optimization
17:00 - 17:30	CONFERENCE REGISTRATION	COFFEE BREAK		
17:30 - 19:00		SESSION B.2. Diesel Engine Modelling (II)	SESSION D.2. Fuels	CLOSURE ADDRESS
19:00 - 19:30		WELCOME ADDRESS		
19:30 - 21:00	WELCOME COCKTAIL			
21:00 - 24:00				GALA DINNER

About UPV CMT-Motores Térmicos

The Universidad Politécnica de Valencia is one of the three Technical Universities in Spain. The University has seven Superior Schools (5 annual courses) and eight Technical Schools (3 annual courses), with about 35.000 students and a teaching staff of 2.000. CMT-Motores Térmicos is a University Department and a University Research Institute at the same time. Founded in 1979 CMT-Motores Térmicos is nowadays composed by about 100 members including professors, researchers, laboratory technicians and administrative staff. Well-known for its research activities centred on thermo-and fluid dynamic processes in internal combustion engines, with a focus on Diesel

automotive engines, CMT-Motores Térmicos is a very active group involved in many R&D projects supported by private companies as well as by public funds, including several European research programs. Research areas include air management and turbo-charging, fuel injection and combustion, pollutant formation and control, noise control, thermal management, as well as development and application of experimental techniques for engine research. The research philosophy of the group combines theoretical, modelling and experimental work to improve knowledge on the basic processes, while providing solutions for the European automotive industry requests ■■

Conference overview

The conference will be held over three and a half days. On the first day, in the afternoon of Tuesday 14th of September, there will be the official opening including a welcome address and a welcome cocktail. Registration will be open from Tuesday afternoon and participants are encouraged to register as early as possible. The technical sessions will start on Wednesday morning the 15th of September and will conclude

on Friday the 17th of September in the afternoon. 40 papers are scheduled, including 6 keynote addresses by prestigious names of the Diesel automotive area. Speakers will be given 30 min. for their presentation, comprising a brief discussion with other participants. A gala dinner will be offered to participants on the 17th of September to close the conference on a happy relaxed note ■■

CONFERENCE REGISTRATION

7:30 ~ 8:30

SESSION A.1.

Fuel Injection & Sprays (I)

8:30 ~ 10:30

Keynote address:

P. MAREZ

Progress in new PSA Diesel powertrain: A contribution to environmental challenge

| P. Marez. PSA PEUGEOT-CITROËN (France) |

Advanced two row nozzle concepts with interacting fuel sprays

| C. Menne, S. Pischinger, M. Jakob, F. Kremer. RWTH AACHEN UNIVERSITY (Germany) |

| H. Rohs, P. Adomeit, M. Lamping, T. Körfer. FEV MOTORENTECHNIK (Germany) |

A new burn rate simulation model for improved prediction of multiple injection effects on large diesel engines

| F. Chmela, G. Pirker, B. Losonczi, A. Wimmer. TECHNISCHE UNIVERSITÄT GRAZ (Austria) |

| J.M. Desantes, J.M. García Oliver. UNIVERSIDAD POLITÉCNICA DE VALENCIA (Spain) |

Effects of mineral and biodiesel fuel compositions on spray evolution and mixture distribution

| L. Allocca, E. Mancaruso, A. Montanaro, L. Sequino, B.M. Vaglieco. ISTITUTO MOTORI-CNR (Italy) |

COFFEE BREAK

10:30 ~ 11:00

SESSION A.2.

Fuel Injection & Sprays (II)

11:00 ~ 13:00

Numerical simulation of developing cavitation flow in a nozzle of pressure atomizer

| A. Sou, T. Kinugasa. KOBE UNIVERSITY (Japan) |

Study of breakup process in dense region of Diesel fuel spray by micro-probe L2F

| D. Sakaguchi, S. Yamamoto, H. Ueki, M. Ishida. NAGASAKI UNIVERSITY (Japan) |

A study on mixture formation process in a Diesel spray using PLIF method

| H. Kojima, H. Kawanabe, T. Ishiyama. KYOTO UNIVERSITY (Japan) |

Influence of the fuel composition on Diesel spray development under engine conditions

| T. Vogel, M. Lutz. ESYTEC ENERGIE-UND SYSTEM TECHNIK (Germany) |

| M. Wensing, A. Leipertz. UNIVERSITÄT ERLANGEN-NÜRNBERG (Germany) |

LUNCH

13:00 ~ 15:30

SESSION B.1.

Diesel Engine Modelling (I)

15:30 ~ 17:00

Keynote address:

F. RAVET

Numerical tools: A new age for engineering

| F. Ravet. RENAULT (France) |

Modelling the injection-rate shapes in Diesel engines

| V. Luckhchoura, A. Chivite, S. Vogel, N. Peters, M. Rottmann, S. Pischinger.

RWTH AACHEN UNIVERSITY (Germany) |

Global reaction model for practical fuels in HCCI applications

| A. Vandersickel, K. Boulouchos, Y.M. Wright. ETH ZÜRICH (Switzerland) |

COFFEE BREAK

17:00 ~ 17:30

SESSION B.2.

Diesel Engine Modelling (II)

17:30 ~ 19:00

Application of the Eulerian-Lagrangian spray atomization (ELSA) model for the Diesel injection simulation

| A. Desportes, M. Zellat, G. Desoutter. CD ADAPCO PARIS (France) |

| Y. Liang. CD ADAPCO LONDON (UK) | F. Ravet. RENAULT (France) |

Application of a stationary flamelet library based CFD soot model for low-NOx Diesel combustion

| G. Nakov, F. Mauss. UNIVERSITÄT COTTBUS (Germany) |

| P. Wenzel, C. Krüger. DAIMLER (Germany) |

Role of formation and transportation of hydroxyl radicals for enhanced late soot oxidation in a low emissions heavy-duty Diesel engine

| J. Eismark, A. Karlsson, R. Lindgren. VOLVO TECHNOLOGY CORP (Sweden) |

| A. Magnusson, R. Ochoterena, I. Denbratt. CHALMERS UNIVERSITY (Sweden) |

SESSION C.1.

Combustion (I)

8:30 ~ 10:30

Keynote address:

J. SENDA

Fuel design approach for spray combustion control by use of multicomponent mixing fuel related to flash boiling spray

| J. Senda. DOSHISHA UNIVERSITY (Japan) |

From conventional to mild HCCI and lifted flame combustion: the new steps to develop low emissions high efficiency Diesel engines

| B. Argueyrolles, S. Dehoux, P. Gastaldi, J.P. Hardy. RENAULT (France) |

Spatial-temporal combustion control in CI engine based on two-stage fuel injection: fundamental study in a rapid compression and expansion machine

| Y. Kobashi. KANAZAWA INSTITUTE OF TECHNOLOGY (Japan) | Y. Kido, M. Kishiura, Y. Oyama, M. Matsumoto, J. Senda, H. Fujimoto. DOSHISHA UNIVERSITY (Japan) |

Effects of spray characteristics and combustion chamber geometry on emission performance in Diesel diffusion combustion...

| S. Haraguchi, Y. Nishimura, Y. Yoshimi, T. Katano, O. Suzuki, K. Matsuura, T. Hakozaiki, A. Kato. HONDA R&D (Japan) |

COFFEE BREAK

10:30 ~ 11:00

SESSION C.2.

Combustion (II)

11:00 ~ 13:00

Control of low-temperature Diesel combustion & emissions via injection rate-shaping & multi-Injections

| J. Kashdan, P. Anselmi, B. Walter. IFP (France) |

Mixture formation and combustion of Diesel sprays from micro-hole nozzle under ultra-high injection pressure

| W. Zhang. MAZDA MOTOR CORPORATION (Japan) |
K. Nishida. UNIVERSITY OF HIROSHIMA (Japan) |

A comparison between pHCCI and conventional combustion regimes on a conventional combustion system

| B. Barbeau. PSA PEUGEOT CITROËN (France) |

Development of a new physically based semi-empirical NOx model using the measured cylinder pressure

| D.T. Hountalas, N. Savva. NATIONAL TECHNICAL UNIVERSITY OF ATHENS (Greece) |
R.G. Papagiannakis. HELLENIC AIR FORCE ACADEMY (Greece) |

LUNCH

13:00 ~ 15:30

SESSION D.1.

Experimental Methodologies

15:30 ~ 17:00

Keynote address:

B.M. VAGLIECO

Non-interfering diagnostics for the study of thermofluid dynamic processes in compression ignition engine

| B.M. Vaglieco. ISTITUTO MOTORI (Italy) |

Planar laser-diagnostics of soot and OH with post-injections in a heavy-duty LTC Diesel engine

| M. Bobba, M. Musculus. SANDIA NATIONAL LABORATORIES (USA) |
C. Chartier, B. Johansson, Ö. Andersson. LUND UNIVERSITY (Sweden) |

Influence of nozzle geometry on spray shape, particle size, spray velocity and the air entrainment of high pressure Diesel spray

| C. Hespel. UNIVERSITÉ D'ORLÉANS (France) | J.B. Blaisot. CORIA-INSA DE ROUEN (France) |
X. Margot, S. Patouna. UNIVERSIDAD POLITÉCNICA DE VALENCIA (Spain) |

COFFEE BREAK

17:00 ~ 17:30

SESSION D.2.

Fuels

17:30 ~ 19:00

Fuel property effects in premixed low temperature Diesel combustion

| T. Li, R. Kakizaki, H. Ogawa. HOKKAIDO UNIVERSITY (Japan) |
M. Murase. JOMO TECHNOLOGICAL RESEARCH CENTRE (Japan) |
M. Suzuki. TOYOTA MOTOR CORPORATION (Japan) |

Low-NOx, low-smoke operation of a Diesel engine using "premixed enough" compression ignition-effects of fuel autoignition quality, volatility and aromatic content

| G. Kalghatgi, L. Hildingsson, A. Harrison. SHELL GLOBAL SOLUTIONS (UK) |
B. Johansson. LUND UNIVERSITY (Sweden) |

Effect of ethanol-Diesel blends on the particle size distributions of a city bus

| O. Armas, M. Lapuerta, A. Gómez, C. Mata. UNIVERSIDAD DE CASTILLA-LA MANCHA (Spain) |

SESSION E.1.**Emissions & Aftertreatment**

8:30 ~ 10:30

Keynote address:

P. MILES**Sources of UHC and CO emissions in low-temperature Diesel combustion systems**

| P. Miles. SANDIA NATIONAL LABORATORIES (USA) |

Investigation of the inflow behavior of a Diesel particulate filter using laser-optical measurement techniques during soot loading and filter regeneration...

| C. Schwenger. MOT (Germany)

U. Wagner, U. Spicher. TECHNISCHE UNIVERSITÄT KARLSRUHE (Germany) |

In-flame evaluation of emission formation in optical and metal engine using high speed camera and endoscope

| M. Lindström. SCANIA CV (Sweden) |

H.E. Ångström. KTH ROYAL INSTITUTE OF TECHNOLOGY (Sweden) |

Carbon particle size distribution function calculations in 3D CFD Diesel engine simulations

| V. Fraioli, C. Beatrice, M. Lazzaro. ISTITUTO MOTORI (Italy) |

COFFEE BREAK

10:30 ~ 11:00

SESSION E.2**Air Management & Turbocharging**

11:00 ~ 13:00

Secondary fuel injection into the exhaust pipe-experimental and computational investigations of the fuel-gas-mixture preparation

| P. Werner, A. Traebert, U. Gärtner. DAIMLER (Germany) |

The asymmetric twin-scroll turbine under engine operating conditions

| N. Brinkert, S. Sumser, S. Weber. DAIMLER (Germany)

K. Fieweger, H.J. Bauer. UNIVERSITÄT KARLSRUHE (Germany) |

Diesel engine with 2-stage turbocharging and variable turbine geometry in passenger cars

| P. Nefischer, M. Grubbauer, J. Honeder, G. Pessl, M. Prosi. BMW MOTOREN (Austria) |

Gas exchange simulation from concept to start of production-AVL's tool chain in the engine development process

| G. Hrauda, R. Strasser. AVL LIST (Austria) |

M. Aschaber. STEYR MOTORS (Austria) |

LUNCH

13:00 ~ 15:30

SESSION F.1.**New Concepts & Engine Optimization**

15:30 ~ 17:30

Keynote address:

C. SOTERIOU**The Diesel nozzle: balancing the cocktail of performance factors**

| C. Soteriou. DELPHI DIESEL SYSTEMS (UK) |

CO₂ potential by extreme downsizing approach

| M. Uhl, E. Dufossé, A. Mauch, J. Tophoven, T. Trzebiatowski, T. Wintrich.

ROBERT BOSCH (Germany) |

Improving engine performance by optimizing fuel reactivity in a dual fuel PCCI strategy

| D.A. Splitter, R.M. Hanson, S.L. Kokjohn, R.D. Reitz.

UNIVERSITY OF WISCONSIN-MADISON (USA) |

Advantages of sophisticated injection strategies in Diesel engines

| O. Kastner, F. Atzler, R. Rotondi, A. Weigand, K. Wenzlawski.

CONTINENTAL AUTOMOTIVE (Germany) |

CLOSURE ADDRESS

17:30 ~ 18:00

GALA DINNER

21:00 ~ 24:00

Poster session

The following poster session is planned to enable the presentation of interesting work that could not be included in the Conference presentations. Abstracts of these works are included in the Conference Proceedings. Conference participants are invited to visit the poster session and discuss the issues with their authors.

List of posters

Analysis of the Initial Soot Formation in a Heavy Duty Diesel Engine During a Sweep in Inlet O₂ Concentration Using Time-resolved Laser Induced Incandescence

U. Aronsson, C. Chartier, Ö. Andersson, J. Sjöholm, R. Wellander, M. Richter, M. Aldén · LUND UNIVERSITY (SWEDEN)
P. C. Miles · SANDIA NATIONAL LABORATORIES (USA)

Advanced 1D-3D Nozzle Flow Simulation Technique Based on AVL Hydsim and Fire

V. Čaika, P. Sampl, AVL LIST (AUSTRIA) · D. Greif, AVL-AST (SLOVENIA) · M. Jelović, AVL-AST (CROATIA)

The Investigation of Different Measurement Methods in Common-Rail High-Pressure Diesel Injection Systems

C. Albrecht · UNIVERSITY OF THE GERMAN FEDERAL ARMED FORCES (GERMANY)

Influence of Jet-Jet and Jet-Wall Interactions on the Lift-Off Length in an Optical Heavy-Duty DI Diesel Engine

C. Chartier, U. Aronsson, Ö. Andersson, B. Johansson · LUND UNIVERSITY (SWEDEN)

Investigation Based Assessment of the Influence of the Injection Parameters on the Fuel Spray Development and Fuel Atomization for Diesel Engine Piezoelectric Injectors

K. Wislocki, I. Pielecha, J. Czajka, D. Maslennikov · POZNAN UNIVERSITY OF TECHNOLOGY (POLAND)

Use of Detailed Kinetics and Advanced Chemistry-Solution Techniques in CFD to Investigate Dual-Fuel Engine Concepts

K. V. Pudukkum, REACTION DESIGN (USA) · S. L. Kokjohn, UNIVERSITY OF WISCONSIN (USA)
L. LIANG, C. V. Naik, REACTION DESIGN (USA) · R. D. Reitz, UNIVERSITY OF WISCONSIN (USA)
E. Meeks, REACTION DESIGN (USA)

On Board Emissions from Light Duty Gasoline, Diesel and CNG Vehicles

J. Merkisz, J. Pielecha · POZNAN UNIVERSITY OF TECHNOLOGY (POLAND)

Spray Collision Modelling of Direct Water Injection Using Graphics Processing Unit

D. Tsuru, S. Kawauchi, H. Tajima · KYUSHU UNIVERSITY (JAPAN)

Conference exhibition

A few prestigious international companies related to the Diesel engine research and development, have agreed to participate to the conference by exhibiting a stand. Conference participants will be encouraged to visit this exhibition in the afternoon of 14th September and throughout the conference, during the coffee and lunch breaks.

HORIBA AUTOMOTIVE TEST SYSTEMS

Landwehrstr 55. 64293 Darmstadt (Germany) · Tel.: +49 (0) 6151 5000 0
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E-mail: info.es@kistler.com · Web site: <http://www.kistler.es>

Conference location and date

The conference will take place in the Conference Building of the Universidad Politécnica de Valencia known as 'Paraninfo' on September 14th-17th, 2010.

Conference secretariat

CMT - Motores Térmicos

Universidad Politécnica de Valencia
Camino de Vera s/n · 46022 Valencia (Spain)

Tel: +34 96 387 76 50

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e-mail: secrecon@mot.upv.es

For updated information on the organization of the conference please visit the web page:

<http://www.cmt.upv.es>

Registration fees

The registration fee is 650 € for early registration and 800 € for late registration received after 11th July 2010.

The fee will include:

- Attendance to the Conference sessions
- Conference Proceedings
- Coffee breaks and lunches during the Conference
- Welcome reception and closure gala dinner
- Transfer by bus to and from Conference hotels to Conference site.

Would-be participants are encouraged to fill in the on-line registration form which may be found on the Conference website (www.cmt.upv.es) and submit it on-line or send it together with the payment form by post, fax or e-mail to the Congress Office Ultramar Express (address given below).

Accommodation

Accommodation may be arranged with the on-line reservation facility offered on the Conference website **www.cmt.upv.es**.

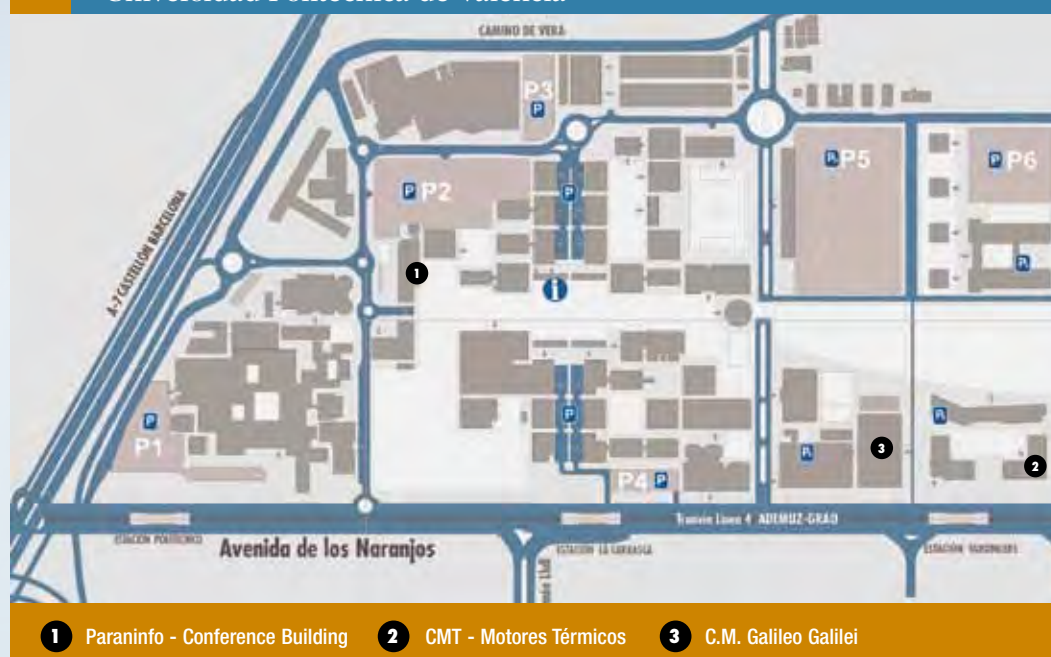
The Conference Organization has reserved a limited number of rooms at a preferential rate for participants in the following hotels:

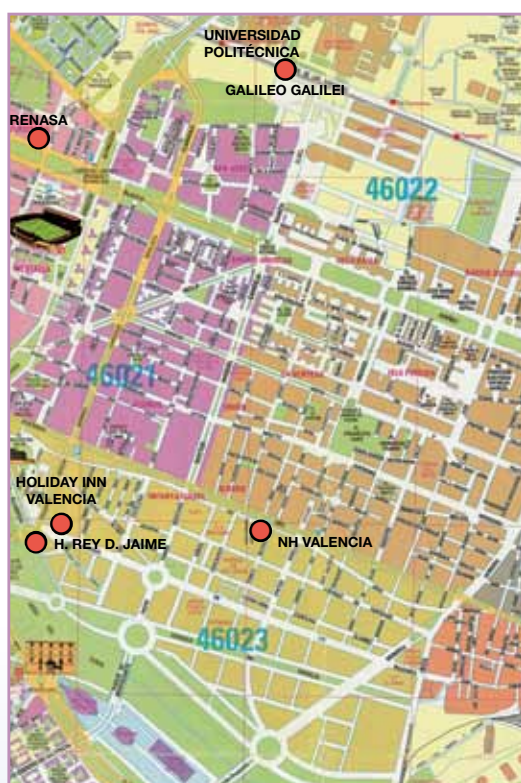
Hotel	Double room for single us	Double room
Hotel Holiday Inn Valencia 4* Paseo de la Alameda, 38 46023 Valencia	90 €	101 €
Hotel Beatriz Rey Don Jaime 4* Avd. Baleares, 2 46023 Valencia	79 €	79 €
Hotel Renasa 3* Avd. de Cataluña, 5 46010 Valencia	72 €	87 €
Hotel NH Ciudad de Valencia 3* Avd. del Puerto, 214 46023 Valencia	55 €	63 €
CM Galileo Galilei Hall of residence on the University Campus Avd. De los Naranjos s/n 46022 Valencia	49 €	69 €

These special fees are only available if the accommodation is managed through Ultramar Express. Prices are per room and night and include breakfast and taxes. Early booking is recommended to ensure availability of a room in the hotel of your choice. Due to accommodation problems in the city of Valencia where many events and fairs take place, no room will be guaranteed after 31st of July 2010.

If you intend to bring an accompanying person, please indicate so in the registration form. This would help us plan a few tourist activities for accompanying persons.

Universidad Politécnica de Valencia





How to reach Valencia



About Valencia

Valencia is a cosmopolitan and lively city on the East Coast of Spain, within easy access to some splendid holiday resorts such as those on the Costa Blanca and Costa de Azahar, and not far from the Balearic Islands. Valencia itself is a fascinating place, with a characteristic blend of historical tradition —with interesting examples of Middle Age and Renaissance architecture— and modern architecture —the City of Arts and Science. It has a varied cultural offer (Oceanographic museum, museum of Modern Arts, ...) and an exciting nightlife, excellent weather and world-renowned festivals and regional cuisine. Taste some of the typical 'tapas' in one of the numerous restaurants outside tables and the traditional 'Paella Valenciana' or one of the dozen rice dishes that Valencian people have invented.

Valencia's beach is an ideal place to spend time sunbathing and swimming. You may also enjoy a nice walk in the shadow of the palm trees of the 'Paseo Marítimo' that lines the sea, or along the new harbour, built for the 32nd America's Cup, and further improved to respond to the high technical demands made by the new Formula 1 urban circuit of the world championship.

We hope that you will enjoy your stay in this Mediterranean city.

How to reach Valencia

- **By plane:** Valencia has an international airport, Manises, located at approximately 4 kms. from the city centre. There are regular scheduled national and international flights from several European airlines. A regular bus line links the airport to the Central train station of Valencia, located in the heart of the city. In addition, the new metro line links the airport to all major city points in Valencia.
- **By road:** The city of Valencia also offers excellent communication by road. The A-7 Mediterranean Motorway that runs north to south provides easy connection to Catalonia and France in the north and to Alicante, Murcia and Andalucía in the south. There are also good road connections to the rest of Spain, in particular the A-3 dual motorway to Madrid.
- **By rail:** Valencia has also very good train connections. The high speed train Euromed links several times a day Barcelona to Valencia in approximately 3 hours. The journey between Madrid and Valencia by the regular high speed link Alaris takes little over 3 hours and 30 min.

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