Workshop on « Spray cooling »

October 8th 2013

Chairmen : M. Gradeck, professor (LEMTA CNRS Université de Lorraine) & P. Gardin (ArcelorMittal Research)

Venue: Room Gallé, Université de Lorraine – 2, avenue de la forêt de Haye 54500 Vandoeuvre les Nancy

Preliminary program:

8h30-9h00 Welcome coffee

9h00-9h10 Introduction by M. Gradeck & P. Gardin

9h10-10h00 Highlights of "AnR IDHEAS" by **F. Lemoine, Université de Lorraine et al.**

10h00-10h45 the need for R & D in industry, **industrials guests**

10h45-11h00 Coffee break

11h00-12h00 "Drop wall interaction onto heated walls" by **M. Marengo, University of Bergamo**

12h00-14h00 Lunch

14h00-15h00 Experimental Techniques for Characterising Sprays by **C. Tropea, TU Darmstadt**

15h00-16h00 Air influence in drop impacts: an overview of different approaches by **C. Josserand, Institut d'Alembert - Paris**

16h00-16h30 Coffee break

16h30-17h30 Round table with guests (speakers and industrials) and conclusion of the day

Expected industrials : ArcelorMittal, Vallourec, CMI, Fives Stein, CIAT,…

Contact:

Professor Michel Gradeck, LEMTA CNRS Université de Lorraine
michel.gradeck@univ-lorraine.fr

Secretary and inscription: Irène Léonard, LEMTA CNRS Université de Lorraine
Irene.leonard@univ-lorraine.fr

Invited Lectures

Drop wall interactions onto heated walls

by Marco MARENGO, University of Bergamo

Spray impact onto hot walls is a process of increasing importance in applied fields. This process is largely used for surface cooing in steel industries, but it is important in many other sectors like fire control (sprinkler), internal combustion engines and more recently it is becoming interesting for accurate local thermal control of hot surfaces. The vertical impact of a single drop onto cold and heated surfaces has been a subject of study for many years, but also the drop impact on unheated tilted surfaces has already been investigated, both for single drop and drop chains, but further studies are still needed to reach a sufficient comprehension of such complex phenomena. It is in fact believed that the understanding of such fundamental process is necessary for deepening the knowledge of the physics of the wall-spray interaction, although it was evidenced that results from single drop impact cannot be directly extrapolated to the more complex spray-wall phenomenon. The present presentation is offering an introduction to the topic, supported by our recent experimental results.

Professor Marco MARENGO leads a research group in the fields of thermo-fluid dynamics, heat transfer and building energy. The group was established in 2007 at the Engineering Department of University of Bergamo.

Experimental Techniques for Characterising Sprays

by Cameron Tropea, Technische Universität of Darmstadt, Germany

Particle characterization in dispersed multiphase flows is important in quantifying transport processes both in fundamental and applied research: Examples include atomization and spray processes, cavitation and bubbly flows, and solid particle transport in gas and liquid carrier phases. Optical techniques of particle characterization are preferred owing to their non-intrusiveness, and they can yield information about size, velocity, composition, and to some extent the shape of individual particles. This lecture focuses on recent advances for measuring size, temperature and the composition of particles, including several planar methods, various imaging techniques, laser-induced fluorescence and some more recent methods in the development phase.

Professor Cameron TROPEA heads an Institute of Fluid Mechanics and Aerodynamics and is Director of Center of Smart Interfaces at the Technische Universität Darmstadt, Germany. His research interests include Atomization and Spray Processes, Optical Measurement Techniques in Fluid Mechanics, Unsteady Aerodynamics and Flow Control. He is Editor-in-Chief of the Springer journal Experiments in Fluids.

Air influence in drop impacts: an overview of different approaches

By Christophe Josserand, Institut D'Alembert, Paris.

Drop impact can be considered as one of the classical problem of multiphase flows. Despite the numerous experimental, numerical and theoretical studies, an overall understanding of the dynamics is still lacking. Moreover, it presents an interesting challenge to test numerical methods because of the high complexity of the flows and of the already existing measures (benchmarks). I will first present the recent challenges that appear in this problem related to the influence of the surrounding gas in the impact. Using different numerical methods I will try to present recent advances on this domain.

Christophe JOSSERAND is DR CNRS at Institut D'Alembert, UMR 7190 CNRS & Université Pierre et Marie Curie (Paris VI). His research concerns the dynamics of complex fluids and systems, in particular, diphasic flows, granular matter and quantum solids/fluids. His work combines both analytical and numerical approaches. Experimental collaborations are also very important in his works on granular flows and diphasic flows. In 2007, he received the bronze medal of CNRS for the high level quality of his works.