Announcement for

the online lectures by

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on

Heat and Mass Transfer in Droplets

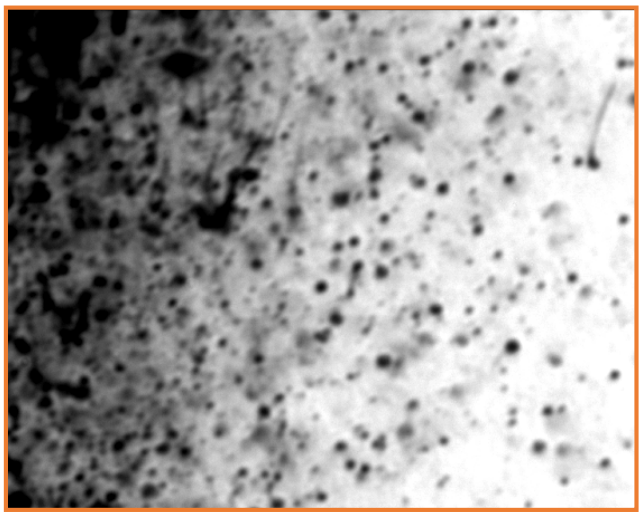
Monday, 1st of March 2021 10:00-12:00 & 14:00-15:00

Tuesday, 2nd of March 2021 10:00-12:00

Modelling of micro-explosions: simple solutions to complex problems

Tuesday, 2nd of March 2021 14:00-15:00

Organisation: B. Weigand*, G. E. Cossali+, A. Geppert*
*Institute of Aerospace Thermodynamics (ITLR),
University of Stuttgart
+Department of Engineering and Applied Sciences,
University of Bergamo



HEAT AND MASS TRANSFER IN DROPLETS

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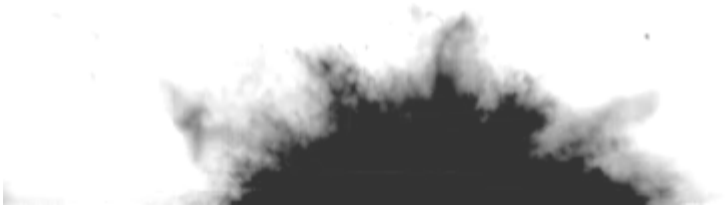
ABSTRACT

The classical model (described by Abramzon and Sirignano), and the most recent developments in the modelling of heating and evaporation of mono- and multi-component droplets, will be presented, and the most important unsolved problems will be discussed. Basic principles of the Discrete Component Model and its applications, including those to biodiesel fuel droplets, will be described. The main ideas of the Multi-dimensional Quasi-discrete Model, its further developments and its applications to Diesel and gasoline fuel droplets will be discussed. Basic principles of the kinetic and molecular dynamic (MD) models for droplet heating and evaporation and their application to automotive fuels will be described. The following unsolved problems will be discussed: limitations of the Effective Thermal Conductivity/Effective Diffusivity (ETC/ED) model; contributions of the interaction between droplets; modelling of droplet heating and evaporation in near-, trans- and super-critical conditions; practically useful (for implementation within CFD codes) approximations of the kinetic effects.

The image was provided by Professor C Crua (University of Brighton, UK)



Modelling of micro-explosions: simple solutions to complex problems

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ABSTRACT

Some new approaches to the solution of complex problems, focused on modelling of micro-explosions in composite fuel droplets, using relatively simple mathematical tools, will be summarised. A number of other developments are also briefly summarised. These include the modelling of heating and evaporation of suspended droplets, the development of new mathematical tools for the modelling of spray ignition and combustion, the modelling of blended fuel droplet heating and evaporation using the previously developed theoretical tools, and the implementation of the newly developed models in ANSYS Fluent.

The image was provided by Professor C Crua (University of Brighton, UK)