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Modelling & Numerical Simulation of Low NOx Pulverized Coal Burners

par

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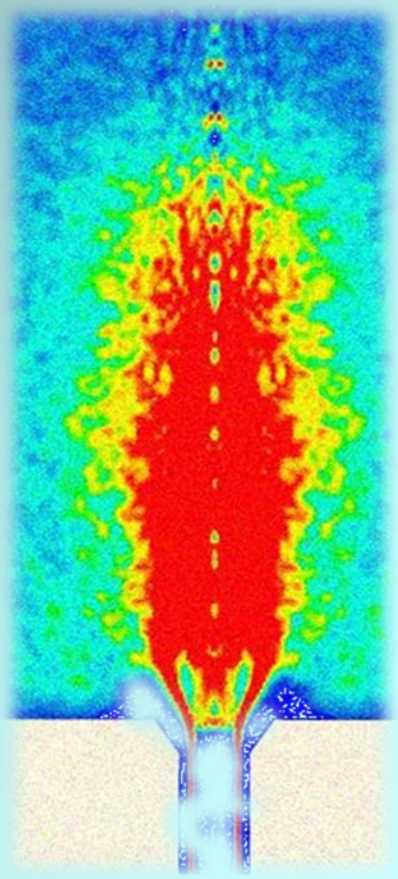
le jeudi 17 avril 2014 à 11h
salle de réunion ICARE



Coal has been one of the main sources of energy in heating and power generation systems. It has higher reserves than other fossil fuels and it is expected that in the coming decades there will be continuing use of coal in energy generation with emerging technologies that will reduce its environmental impacts. In this respect, numerical simulation has become an indispensable tool for optimizing combustion systems to reduce pollution. For the phenomena involved in coal particle combustion process, mathematical models are proposed with different levels of complexity. In addition to gaseous combustion models, gas-particle flow interactions, devolatilization and heterogeneous combustion of char particles must be coupled to fluid dynamics computation codes (CFD).

The models for coal combustion and their use in simulation of Low NOx Pulverized Coal Burners will be discussed. Focus will be on the Reynolds Averaged Navier-Stokes (RANS) simulations where all the turbulence scales are modeled. Results from the preliminary work, including simulations of a 10 MW scale burner will be presented.

A brief explanation for the second part of thesis study will be given, in which it is planned to study the flame front behavior in a simpler configuration[1] of turbulent gaseous combustion loaded with solid (coal) particles. For this case, Large Eddy Simulation will be used where energy carrying large scales (eddies) are computed while more universal smaller scales are modeled. The results from this work can be used to improve RANS simulations in large scales.

[1] Hwang, S.M., Kurose, R., Akamatsu, F., Tsuji, H., Makino, H., Katsuki, M. Application of optical diagnostics techniques to a laboratory-scale turbulent pulverized coal flame. Energy & Fuels 19, 382–392 (2005).

Pour tout renseignement complémentaire, ou proposition de séminaire par un thésard ou un chercheur invité, contacter Ivan Fedioun, fedioun@cnrs-orleans.fr, poste 5520, 06.62.81.23.08