

ENI AWARD 2009

Debut in Research Prize

Winner

Alberto Cuoci

Pollutant Formation in Turbulent Reactive Flows: Interactions between Chemistry and Turbulence

Biography

After his graduation in Chemical Engineering from the Politecnico of Milan in 2004 Alberto Cuoci obtained his PhD cum laude under Prof. Tiziano Fartavelli's supervision in Industrial Chemistry and Chemical Engineering from the same school in May 2008. He has stayed on at the Politecnico and starting from the academic year 2008/2009 he is teaching a course of "fire fluidynamics". His PhD thesis focused on the relation between reaction flows and turbulence, focusing on the effects of these aspects in the case of fires.

His job is of crucial interest in the combustion field – particularly with regard to emissions – considering the urgent need for a drastic decrease in polluting agents.

Alberto Cuoci spent a year of his PhD studies from October 2006 until August 2007 as a *visiting scholar* at the University of Utah, where he continued his studies with Dr. P. J. Smith's group of researchers who is working specifically on the combustion field, to comprehend the physical and chemical phenomena that take place in these events.

The need for a highly accurate and efficient modelling in the fire kinetics and fluidynamics field turns this into the first necessary step towards the study and creation of new and more efficient combustion devices. Nowadays, for technical reasons, it is still impossible to create a general model that can accurately combine and predict data and kinetic and fluidynamic behaviours in detail.

A. Cuoci's work contributes substantially to fill this gap thanks to the specific modelling that can give a quite accurate prediction of the characteristics of nitrogen oxide (NO_x) formation through the calculation of complex fluidynamic code data. Furthermore his modelling of turbulence fluctuation enables scientists to obtain information also about soot formation, another polluting by-product.

Reasons for the choice

Ing. Alberto Cuoci has developed a thesis entitled "Pollutant formation in turbulent reactive flows". His work offers a significant contribution for the characterization of nitrogen oxides formation and as a consequence for designing cleaner and more efficient combustion devices.