

DYNAMIC BEHAVIOR OF A MULTI-BURNER EXCESS ENTHALPY COMBUSTION SYSTEM (MEEC) FOR INDUSTRIAL PROCESS FURNACES

PROJECT AIM

The objective of the project is to generate useful detailed knowledge and design rules for multi-burner EEC (flameless combustion) systems. The study will be a combined insight in two experimental setups at the Energy Technology section and the department of Multi-Scale Physics: a 300 kWth multi-burner furnace and a single burner setup. The following effects will be studied:

- o time scales of switching of burning mode of regenerative burners
- o heat sink response
- o turbulent fluctuations

PROGRESS

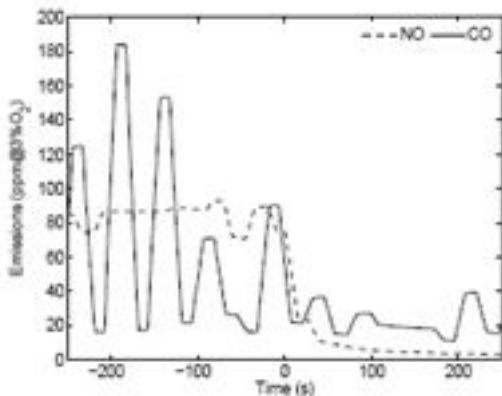
A 3x100 kWth multi-burner FLOXTM furnace has been commissioned and a first test campaign has been started. Low CO and NOx emissions were measured at different burner configurations and firing modes. Also, CFD simulations of this furnace were performed. The study showed that using the Eddy Dissipation Concept turbulence chemistry interaction model in combination with a sufficiently large reaction scheme (16 species and 47 reactions) the most reasonable results were obtained. These results, however, need to be validated against experimental data from the furnace. Also, a comparison will be made with theoretical and experimental results obtained from a two flameless oxidation (NFK) burner furnace at KTH. A more fundamental CFD analysis of a single gas turbine FLOXTM-type burner was finalized and a journal article was submitted. In this study the same turbulence chemistry interaction model and reaction scheme were investigated.

DISSERTATIONS

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SCIENTIFIC PUBLICATIONS

1. Danon, B. and de Jong, W. (2008) Experimental study on ultra-low emission combustion in a combustor firing LCV gas. In: Proceedings of the 7th High Temperature Air Combustion and Gasification International Symposium, 13-16 January, Phuket, Thailand.



PROJECT LEADERS

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RESEARCH THEME

Complex dynamics of fluids

PARTICIPANTS

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COOPERATIONS

KTH, Sweden, UGhent, Belgium
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FUNDED

STW, NVV

1st - 2nd 75% 3rd 25%

START OF THE PROJECT

2005

INFORMATION

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