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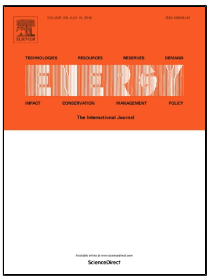

Numerical analysis of a non-steady state phenomenon during the ignition process in a condensing boiler

Manuel Mohr, Marko Klančišar, Tim Schloen, Niko Samec, Filip Kokalj

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Numerical analysis of a non-steady state phenomenon during the ignition process in a condensing boiler

Manuel Mohr [a], Marko Klančišar [b], Tim Schloen [c], Niko Samec [d], Filip Kokalj[*, e]

[a] Max Weishaupt GmbH, Germany, e-mail: fg.mohr@weishaupt.de
[b] Max Weishaupt GmbH, Germany, e-mail: fg.klancisar@weishaupt.de
[c] Max Weishaupt GmbH, Germany, e-mail: fg.dr.schloen@weishaupt.de
[d] University of Maribor, Faculty of Mechanical Engineering, Slovenia, e-mail: niko.samec@um.si
[e] University of Maribor, Faculty of Mechanical Engineering, Slovenia, e-mail: filip.kokalj@um.si

Abstract

This paper presents the most appropriate numerical approach for investigation of the ignition phenomena of the premixed confined combustion in a condensing boiler. A transient simulation with the coupling of the burning velocity model was sufficient enough to describe fully the phenomena that are responsible for the ignition sequence and the flame stabilization, representing most of the actual ignition problems in general. Detailed simulation investigation with the ignition model leads to better comprehension of the whole flame stabilization process and, as a consequence, it facilitates the optimization potential of the global ignition process in boilers. Four different ignition power loads were observed in the investigation. Also, the ratio between oxidizer (air in our case) and the fuel (Methane) was based on the normal combustion process for the described condensing boiler. The numerical results were validated with the experimental set up and testing. Results comparison shows very good correlation of numerical simulation with the experimental case. The ignition times both tested and simulated, that have a significant impact on flame stabilization, are in very good correlation. Also, very good correlations were obtained between the pressure profiles of the numerical and experimental studies.

[*] Corresponding author at: Faculty of Mechanical Engineering, University of Maribor, Smetanova 17, SI-2000 Maribor, Slovenia.
E-mail address: filip.kokalj@um.si (F. Kokalj).

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