

Low load operating protocol investigation of a 620MWe power boiler using a fast Eulerian-Eulerian CFD model

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Abstract

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Low load operation of utility boiler

Keywords: CFD, Eulerian-Eulerian, Boiler, Low-load operation

Nomenclature					
Symbol	Quantity	Unit	Greek letters		
			α_p	Particle absorption coefficient	m^{-1}
A	Area	m^2	g	Gravity	m/s^2

1. Introduction

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- document style
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2. Mathematical model

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- 25 (1) Group the authors per affiliation.
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3. Numerical setup

30 Validation separately mention the rates/loadings - give results for 40% case inputs Low Ultra low load inputs

Table 1: Utility boiler fuel characteristics

Fuel constituent	Fraction	Unit
<i>Ultimate analysis - (DAF)</i>	-	-
Carbon	0.7753	kg/kg_{fuel}
Hydrogen	0.0415	kg/kg_{fuel}
Nitrogen	0.0181	kg/kg_{fuel}
Oxygen	0.1474	kg/kg_{fuel}
Sulphur	0.0175	kg/kg_{fuel}
<i>Proximate analysis - (AR)</i>	-	-
Fixed carbon	0.340	kg/kg_{fuel}
Volatile matter	0.196	kg/kg_{fuel}
Ash	0.4090	kg/kg_{fuel}
Moisture	0.0550	kg/kg_{fuel}
Energy content - (DAF)	Value	
Higher heating value	15070	kJ/kg_{fuel}

Table 2: Low-load boiler input boundary conditions - 40% MCR

Primary air & pulverized coal inlet		Unit
PA mass flow rate		
Coal mass flow rate	0.0731	kg/s
Temperature	343.15	K
Coal mass flow rate	23.02	m/s
Secondary air inlet		
Mass flow rate		kg/s
Temperature	573.15	K

Table 3: Ultra low-load boiler input boundary conditions - 25% MCR

Primary air & pulverized coal inlet		Unit
PA mass flow rate		
Coal mass flow rate (Dry)		kg/s
Temperature		K
Secondary air inlet		
Mass flow rate		kg/s
Temperature		573.15 K

3.1. Model validation

The validation of the proposed model was conducted for three steady state MCR loads of 100%, 80% and 60%. The

Figures of the Histrograms and CO graphs as in paper Data plots and overall performance of the model Inputs for the various loads table

4. Results & discussion

5. Conclusions

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References

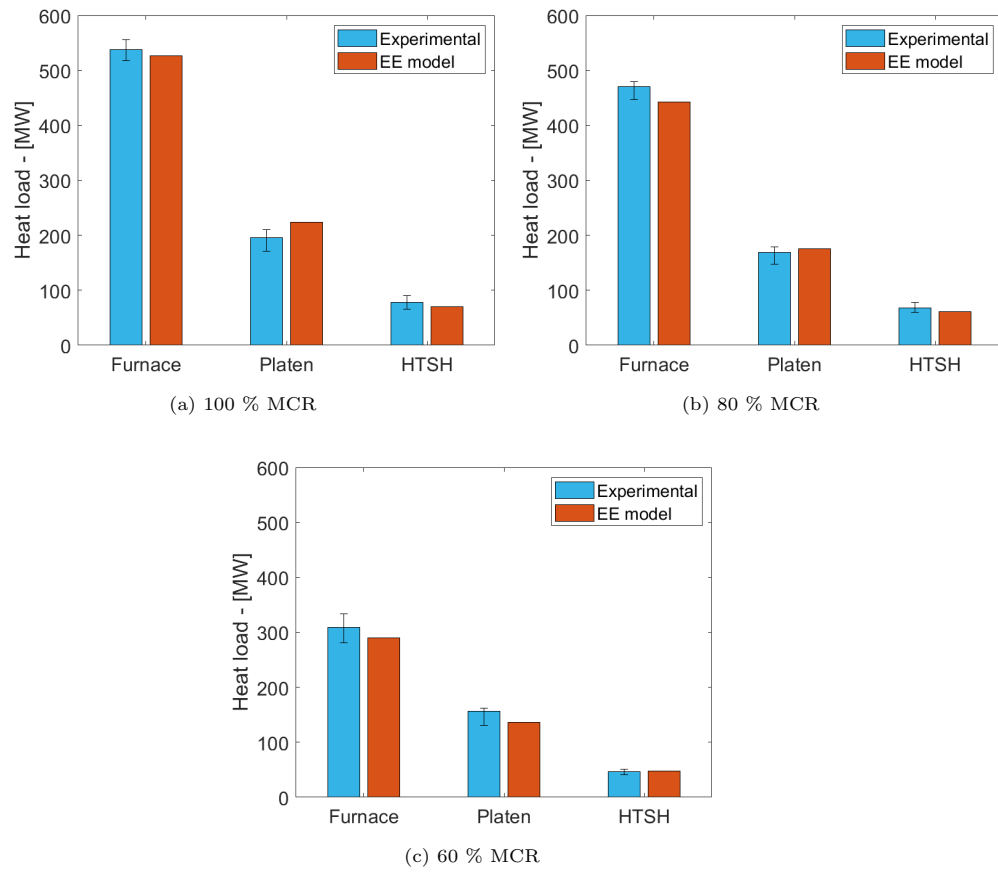


Figure 1: Validation of the experimental and models heat load to the furnace, PSH and HTSH for steady state loads of a) 100% MCR, b) 80% MCR and c) 60% MCR