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

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

1. Introduction

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2. Mathematical model

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3. Numerical setup

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**
Ultimate analysis - (DAF)	-	-
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}
Proximate analysis - (AR)	-	-
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}

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

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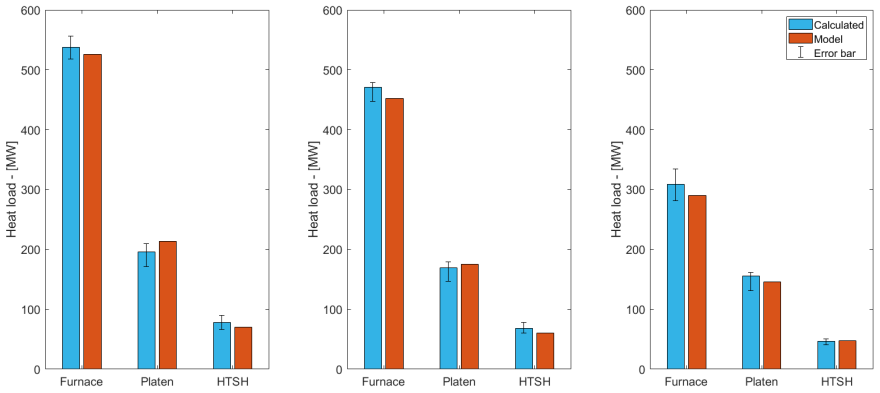
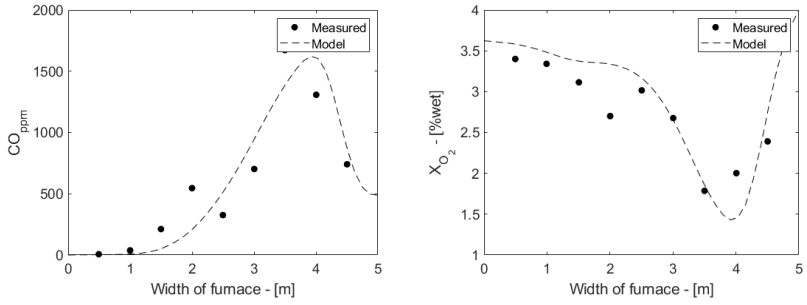


(a) (b) (c)

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



(a) (b)

Figure 2: Experimentally calculated CO and O_2 concentration predictions at a height of 37.5 (m)

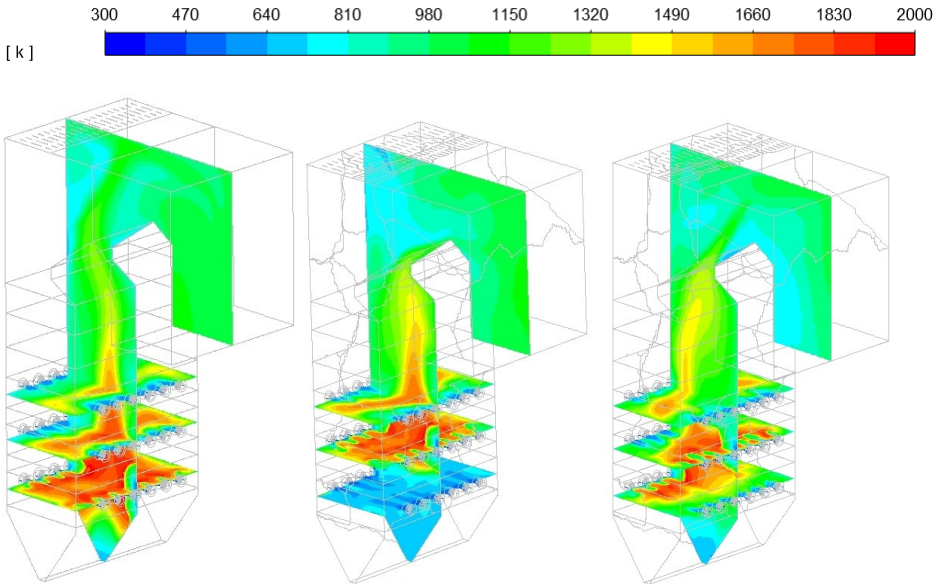


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Figure 3: Hi

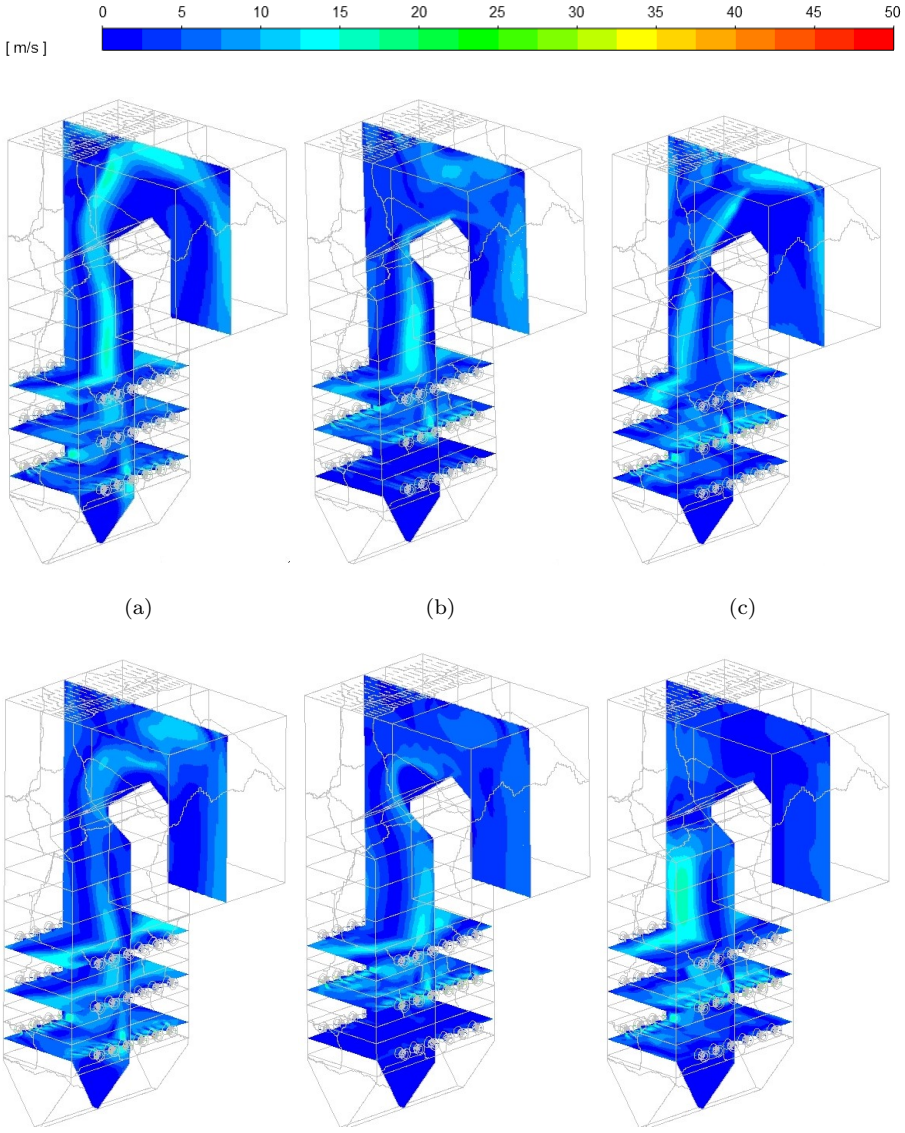

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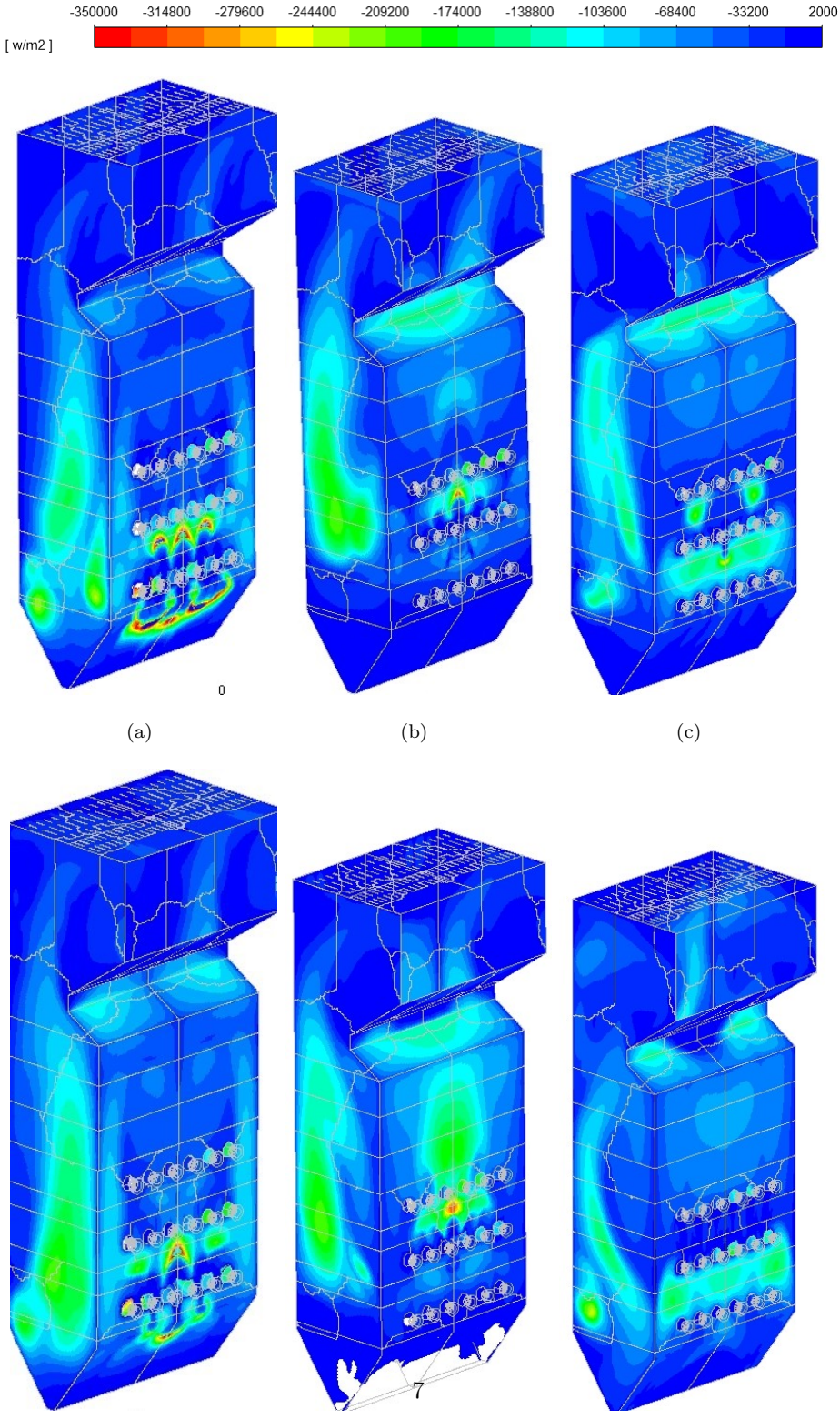
Figure 4: bye



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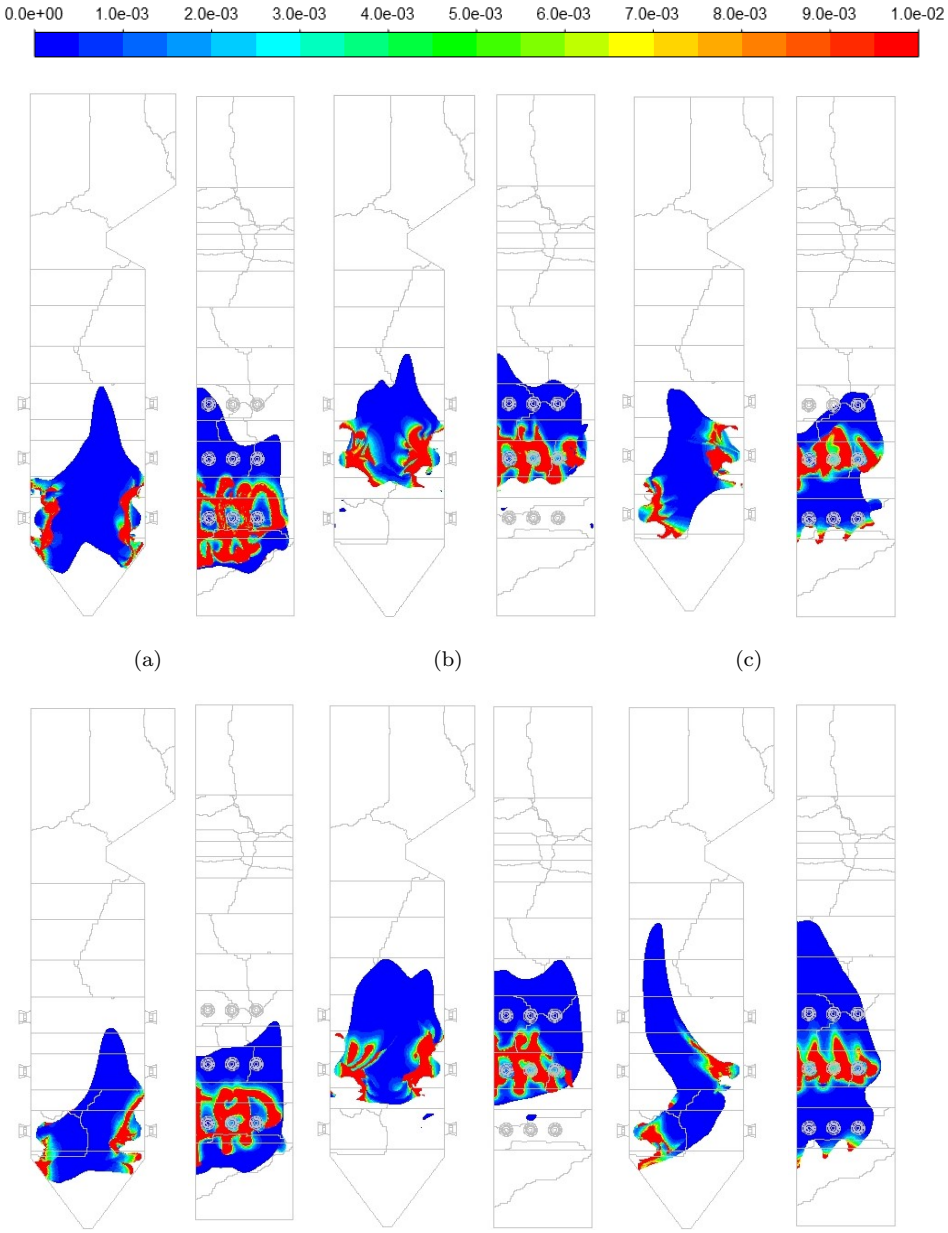
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(a) (b) (c)

(d) (e) (f)

4. Results & discussion

5. Conclusions

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References