

COUPLED PARAMETERIZED REDUCED ORDER MODELLING OF THERMO-HYDRO- MECHANICAL PHENOMENA ARISING IN BLAST FURNACES

PRINCIPAL INVESTIGATOR:

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EARLY STAGE RESEARCHER:

Nirav Shah Vasant

HOST INSTITUTION:

SISSA, IT

SECONDMENT INSTITUTION:

- AMIII- ES
- ITMATI- ES

PLANNED SECONDMENT:

50% of the time at AMIII, in the form of 6-months stays, possibly combined

LENGTH:

36 months



wind energy Databases
Simulation Business processes
Data mining Photovoltaic Choice
Strategy Industrial processes Solar
Exploitation of internal information Bioestadística Optimization
Quality control Logistics Modelling Software
Market studies Business intelligence
Pollutants Renewables
Dispersion Propagation Planning
Analysis of customers

Project Description:

In the blast furnace process knowing the thermo-mechanical behaviour of the fluid-channel ensemble or of its hearth walls improves process efficiency. The parameterization of developed models with respect to geometry design of several channels or hearth walls and to their material types is essential in order to quickly transfer the results to the design of new blast furnaces. The project focuses on **mathematical modelling of thermo-hydro-mechanical phenomena** arising in blast furnaces during the casting. When fine coupled models are available then for the simulation reduced order models are needed. These have to be constructed with efficient methods that preserve the coupling and the parameter structure. The project focuses on model reduction and numerical simulation of thermo-hydro-mechanical effects

Description of academic partner:

SISSA, the **International School for Advanced Studies**, was founded in 1978 and is a scientific center of excellence within the national and international academic scene. It features 70 professors, about 130 post-docs, 250 PhD students and 95 technical administrative staff. The three main research areas of SISSA are Physics, Neuroscience and Mathematics. All the scientific work carried out by SISSA researchers is published regularly in leading international journals with a high impact factor, and frequently in the most prestigious scientific journals such as Nature and Science. The School has also drawn up over 280 collaboration agreements with the world's leading schools and research institutes.

The **Instituto Tecnológico de Matemática Industrial (ITMATI)** is a public consortium of the three Galician universities (A Coruña, Santiago de Compostela and Vigo). ITMATI provides advanced solutions for productive sectors in three main transfer areas: Numerical Simulation, Statistics and Big Data and Optimization. Its main goal is to enhance the mathematical to companies in order to improve competitiveness and support innovation. ITMATI has a staff made up of 26 highly qualified professionals, 19 of whom are researchers. In addition, ITMATI has 39 affiliated researchers with extensive and recognized expertise, selected from the 3 Galician universities.

Portfolio of Industry Partner:

ArcelorMittal Innovación Investigación e Inversión S.L. (AMIII) belongs to the Group ArcelorMittal. It is specialized in the implementation of new technologies in different phases of the steelmaking process, becoming a reference point for the development of innovative technology projects at national and European level, due to its closely collaboration in the development of projects with other European steel companies of the Group ArcelorMittal. Research includes advanced process control and monitoring systems at industrial plants, energy, environment and recycling research, intelligent systems development, and novel data mining techniques.



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