

# **Modelling and simulation of ironmaking blast furnaces for low CO<sub>2</sub> emission and high process efficiency**

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The design and control of blast furnace (BF) ironmaking must be optimized in order to be competitive and sustainable, particularly under the more and more demanding and tough economic and environmental conditions. To achieve this, it is necessary to understand the complex multiphase flow, heat and mass transfer, and global performance of a BF under different conditions. Mathematical modelling, often coupled with physical modelling, plays an important role in this area. This talk will present an overview of modelling and simulation of industrial BFs in our laboratory, focused on two aspects: model development and model application. The model development will be discussed in terms of model formulation, new features and model validation. Our recent efforts in modelling layered cohesive zone and particle size reduction and developing an integrated BF model will be highlighted. Then, the usefulness of the BF models will be demonstrated through various model applications in optimizing burden distribution, pulverised coal injection and BF profile, as well as exploring new ironmaking technologies such as oxygen BF and hydrogen injection. Finally, areas for future development will be briefly discussed.