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Numerical simulations and model development for metallurgical processes

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Industrial production processes feature a range of fluid- or particle-based flows, converting primary or secondary raw materials and resources into highly refined products. Observations of flow details and measurements of flow patterns are particularly difficult in some industrial settings, where extreme process conditions like high temperatures and pressures, dust and chemical reactions prevent close scrutiny of the flow. Digitalization is a key ingredient for both the modelling and observability of such processes, since realistic digital models enable offline monitoring and exploration, and help to efficiently design and exploit suitable surveillance strategies. It is thus of high importance to advance the modelling and simulation of flow-based processes. In this talk, I will give an overview of the different processes in iron- and steelmaking, and the modelling approaches being used in the description and analysis of these processes. Methods range from computational fluid dynamics, discrete element method or flowsheeting simulations to data-driven modelling employing machine learning and advanced data analytics. These approaches will be illustrated using the example of the Ruhrstahl-Heraeus treatment in steel plants, an essential process step in the production of ultra-clean steels.

Category

Other

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