Contribution ID: **25** Type: **Talk**

Understanding metal losses during furnace tapping operations using HPC

Friday, 3 December 2021 15:45 (30 minutes)

During the pyrometallurgical production of industrial commodities such as ferromanganese and ferrochromium in electric smelting furnaces, immiscible molten slag and metal phases are tapped from the unit at regular intervals. This process involves opening a dedicated channel in the furnace sidewall (the tap-hole) and allowing the contents of the vessel to drain through it. After exiting the tap-hole, the stream of molten material is directed along open launder channels and empties into one or more storage ladles. During this process intermixing of slag and metal phases often occurs, and if not carefully managed, can result in significant metal being lost to the waste slag by entrainment.

In this presentation we show the results of a computational fluid dynamics study of the multiphase free surface fluid flow in tapping ladles, and examine how the application of high-performance computing has greatly expanded our ability to explore the unusual and challenging parameter spaces of problems in pyrometallurgy. Access to facilities such as CHPC allows us to build deeper intuition and fundamental understanding of the complex fluid flow phenomena occurring during ladle tapping, and is able to guide us to practical engineering solutions for mitigating losses due to phase mixing.

Student?

No

Supervisor name

Supervisor email

Primary author: Dr REYNOLDS, Quinn (Mintek)

Presenter: Dr REYNOLDS, Quinn (Mintek)

Session Classification: HPC Applications

Track Classification: Computational Mechanics