

Advanced Modeling of Multiphase and Magnetohydrodynamic Phenomena in Continuous Casting

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Surface defects in continuous casting are often initiated by transient multi-phase flow in the mold: asymmetric/oscillating jets, meniscus instabilities, and near-surface transport and entrapment of inclusions and slag droplets. This talk presents multi-phase flow simulations to quantify these mechanisms, benchmarked against water-model experiments.

Electromagnetic braking (EMBr) is discussed as a practical lever to restructure mold flow and suppress asymmetric regimes, with direct relevance to surface quality. Finally, a regression-based analysis is introduced as an example of how high-fidelity simulation data can be reduced into fast, defect-relevant monitoring tools.

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