Numerical and Experimental Investigation of Fluid Flow in Large Ingot Uphill Casting Process

ZHANG Xiaohuan

Department of Ferrous Metallurgy,
RWTH Aachen University,
Germany

The flow dynamics of ingot bottom teeming process plays an important role on the quality of steel ingots. In this study, the flow conditions during filling a 1:4 scale model of a 60-tonne ingot mould were investigated. Both of the numerical simulation with OpenFOAM software and water model experiments found that, some air could be entrapped into the flow of liquid during pouring into the mould. The resulting turbulence flow increases the possibility of slag entrapment. The influence of different parameters on the flow conditions was studied, such as the velocity of liquid flowing into the mould, and the design of nozzles at the mould bottom. The numerical predictions of flow fields were compared with the experimental measurements. Further on, water model experiments gave also interesting results on 3-phase fluid flows: 'steel', 'slag', and 'gas'.

Co-authors: **Zhiye Chen, Dieter Senk, Xiaoxue Liu, Shahid Maqbool**