

Magnetohydrodynamic siphon for tapping out liquid metals

Riveros,

Warczok,

The evacuation of liquid metals or mattes from metallurgical furnaces presents many operational challenges due to safety issues and the fast destruction of tapping blocks. Particularly, a continuous smelting and converting processes requires continuous tapping out with a precise control of the liquid metal or matte flow. Siphons are used in numerous metallurgical reactors including shaft furnaces for copper concentrate smelting and the Mitsubishi electric furnace. A new technique for the precise tapping out of metals or mattes has been developed. It is based on the apparent change of specific gravity of conducting liquids placed in a cross of a constant electric field and a permanent magnetic field. Additionally, the Lorentz' force in uniform electric and magnetic fields can be controlled by the magnetic flux and current intensity. This allows for a precise temperature control of the metal or matte. Fluidodynamic and heat transfer modeling, supported by low temperature physical modelin