

عنوان مقاله:

Determine the optimum thickness of frozen layer of aluminum reduction cells in order to reduce heat losses

محل انتشار:

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خلاصه مقاله:

Aluminum reduction cells are designed such that a layer of frozen bath forms around the sidewalls of the cell. The thickness of this frozen layer is a function of the heat flowthrough the sides, which is a function of the difference in bath temperature and liquid temperature. The temperature drop over the electrolyte-ledge boundary layer is referred to as the superheat of the electrolyte. Under steady state conditions, the heat flow through theboundary layer QBL and the heat flow through the frozen ledge QSL are in balance. When the heat flows are not in balance, the situation will adjust itself by freezing or melting of the ledge. The formation of side ledge is thus controlled by the superheat. Due to the fact that the melting/solidification process inside the cell is highly nonlinear, the thickness of the ledge can be determined from a single nonlinear differential equation since the heatdistribution will be represented by a linear and time-invariant state-space model. This model can predict the time-varying shape of the side ledge in situations .like increase or decrease in superheat or in different temperature of the bath

کلمات کلیدی:

Optimization, Frozen layer, Aluminum reduction cell, Heat losses

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