# Numerical simulation of magnetohydrodynamic process in metallurgical DC furnaces

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**Abstract:** In recent years metallurgical industry is search for modern technology based on low energy and resources consumption. One of modern approach for remelting of raw materials is DC furnaces with bottom electrodes. The exploitation of such furnaces has shown problems with increase wear of the bottom electrodes. The reason of this increase wear is vortex flow generated by electromagnetic forcing in liquid metal. In present work the model of preceding process of liquid metal in DC furnace with bottom electrodes, as well software based on the standard commercial software are developed [1]. This model provide possibility to carry out simulations of electric and magnetic parameters, temperature distribution with Joule heat and heat from the arc and hydrodynamic process with taking into account electromagnetic parameters as Lorentz force and heat exchange processes.

The work deals not only with development of the approaches for the numerical simulation but also advice methods for the control of liquid metal vortex flow in the DC furnace with the bottom electrodes by changes of bottom electrode parameters and furnace volume construction. It is shown that cooling down the bottom electrode to the melting metal temperature leads to the decrease of shear stress on the fettle area by 15 %, bottom electrode lifting above the surface at the electrode radius â€“ by 30 %, and the bath form change â€“ by 50 % [2].

**Keywords:** Numerical simulation, Electrovortex flow, DC metallurgical furnace

## References

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