Numerical Modelling of Copper Melt Flow in Technological Processes

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Abstract:

The law of conservation of the sum of information and entropy that was formulated in the middle of the 20th century, is still used only for the abstract analysis of any complex systems but not for specific processes in the implementation of complex chemical and metallurgical flowsheets. Based on the analysis of the existing entropy-informational patterns, the evidence of their mathematical correctness, the calculation formulas were obtained to assess the technological uncertainty and completeness of each stage and the scheme as a whole for typical copper metallurgical industries. The calculation formulas are proposed for a single expression of the degree of recovery and content of a valuable component by conversions and procedures for their combination according to the technological flowsheet as a whole. The entropy-information analysis of technological stages is based on the method proposed by C. Shannon for calculating the amount of stochastic (unpredictable) and deterministic (predictable) information. On the basis of the studies conducted on the methods of smelting non-ferrous metals on the example of the production of copper, we have established as the most adequate truly priority Outokumpu autogenous process.

Keywords:

Mathematical model, numerical modeling, hydrodynamics, incompressible melt's motion, copper rod.