MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: **1427** Type: **Poster Presentation**

Tue-Af-Po2.25-03 [114]: Sensitivity Analysis of Parameters in Transverse Flux Induction Heating Model

Tuesday, 24 September 2019 14:00 (2 hours)

Compared with traditional open fire heating, induction heating has the advantages of high efficiency, energy saving and environmental protection. There are two basic forms of induction heating: longitudinal flux induction heating (LFIH) and transverse flux induction heating (TFIH). The magnetic induction line produced by TFIH is perpendicular to the heated workpiece, which is suitable for heating strips with small cross-section area. With the development of heat treatment industry, the heating treatment of metal strips has become a trend in the industry. Therefore, TFIH technology is widely used. Although the technology of TFIH has been greatly developed, but the temperature distribution uniformity of the strip surface along the width direction of the strip at the outlet of the heater (Trel) is poor. The TFIH model is used to simulate and analyze the heating process of the strip by using the 3D finite element method (FEM). The four parameters of the model, include the effective value and frequency of exciting current, the structure of heater coil and the moving speed of the strip, have great influence on the Trel. However, the influence of the four parameters changing on Trel has not been sorted so far. Sensitivity analysis is used to evaluate the influence of model parameters changing on the results of model calculation qualitatively or quantitatively. Sensitivity analysis involves two methods, local sensitivity analysis (LSA) and global sensitivity analysis (GSA). In this paper, morris method of GSA is used to analyze the influence of the four parameters changing on Trel. The sensitivity values of the four parameters are sorted, which can provide an optimal priority for the optimization of TFIH model parameters, so that the strip surface temperature distribution at the heater outlet can be more uniform.

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Session Classification: Tue-Af-Po2.25 - Novel and Other Applications III