Thermo mechanical modeling of continuous casting with artificial neural network

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Abstract

Artificial neural networks have been successfully used for many years to solve industrial problems. The essence of the artificial neural networks is to find the rule during learning to connect output values with input parameters. Another advantage of artificial neural networks is the calculation speed. Once the network is trained, the approximation is very fast.

In seminar we will focus on continuous casting process of steel. Continuous casting is currently the most common process in steel production. Approximately 90% of all steel grades are produced by this technique. First we will describe continuous casting process and necessary equipment [1]. Then we will present its physics [5]. In second chapter we will present artificial neural networks. We will describe neural network history, define different types of networks, describe how to build an artificial neural network, what are its components and how to use them [4,6]. We will very clearly present the basics about artificial neural networks [3]. In third chapter we will describe the use of artificial neural network in an industrial problem. Physical model for continuous casting of steel was developed in Laboratory for Multiphase processes and is now in daily use by StoreSteel company [2]. This physical model takes about 90 seconds to calculate three basic output values (metallurgical length, shell thickness and billet surface temperature). The artificial neural network calculates this in less than a second. But first we need to train the neural network with training data. We will get the training data with physical model. The dedicated program will iteratively run the physical model and calculated data will be stored in correct format. After completing the neural network training operation, we will verify the network with proper statistic and with some parametric studies.

References

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