Stable Eutectoid Transformation in Nodular Cast Iron: Modeling and Validation

Cita:

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Abstract

This paper presents a new microstructural model of the stable eutectoid transformation in a spheroidal cast iron. The model takes into account the nucleation and growth of ferrite grains and the growth of graphite spheroids. Different laws are assumed for the growth of both phases during and below the intercritical stable eutectoid. At a microstructural level, the initial conditions for the phase transformations are obtained from the microstructural simulation of solidification of the material, which considers the divorced eutectic and the subsequent growth of graphite spheroids up to the initiation of the stable eutectoid transformation. The temperature field is obtained by solving the energy equation by means of finite elements. The microstructural (phase change) and macrostructural (energy balance) models are coupled by a sequential multiscale procedure. Experimental validation of the model is achieved by comparison with measured values of fractions and radius of 2D view of ferrite grains. Agreement with such experiments indicates that the present model is capable of predicting ferrite phase fraction and grain size with reasonable accuracy.