

Analysis of phase transformations in Fe - 1.1C - 0.9Si – 0.4Mn – 8.3Cr – 2.1 Mo – 0.5V steel using dilatometry and computational thermodynamics

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Steels represent the important class of materials with wide range of properties, depending on their composition and processing. Understanding the phase transformations during heating and cooling and the influence of alloying elements on the kinetics of these phase transformations is essential for improving the properties of steels [1]. In this work the phase transformations in Fe - 1.1 C - 0.9 Si - 0.4 Mn - 8.3 Cr - 2.1 Mo - 0.5 V tool steel are described using dilatometry and computational thermodynamics. NETZSCH DIL 402 C dilatometer, Thermo-Calc [2] and JMatPro [3] software were used. In dilatometry experiments the constant heating rate 5K/min and different cooling rates (1 - 15) K/min were used, in temperature range (30 - 1100) °C . The results emphasize the importance of computational thermodynamics in interpreting and understanding the experimental data related to phase transformations.

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[1] E. Pereloma, D.V. Edmonds: Phase transformations in steels. Volume 1: Fundamentals and diffusion-controlled transformations. Woodhead Publishing Limited, 2012.

[2] <https://thermocalc.com>

[3] <https://www.sentessoftware.co.uk/jmatpro>