

## Crystallography of Martensitic Transformation in Steels: Advances in Experimental and Theoretical Research

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**Abstract.** Advances in experimental and theoretical researches of martensite in steels are surveyed which attracts a renewed interest since EBSD and high resolution TEM techniques have provided new quantitative data on crystallography of martensitic transformations. Thus, inter-phase orientation relationships (ORs) can be determined by EBSD even in the absence of retained austenite. Such ORs, in turn, enable accurate analysis of orientation variant pairing which notably influence steel properties; the same data make it possible to reconstruct textures and hence evaluate structural states of prior austenite in terms of local orientations in martensite. Novel theoretical approaches aimed to overcome shortcomings of phenomenological theory of martensite crystallography were considered, including atom-scale topological models and the recently proposed micromechanical models. Finally, potentiality and limitations of the current advances are discussed.

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