COUPLING OF MARTENSITE VARIANT IN STEELS

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The geometrical compatibility between martensitic plates is analyzed theoretically and compared with experimental results on the frequency of variant-pairing in the four morphologies: thin-plate, lens, butterfly and lath. The martensitic microstructure is formed by pairing of martensite plates. The crystallographic character of a single martensitic plate is explained by the phenomenological theory of martensite crystallography, which considers the interface between the parent and martensite to be geometrically compatible. It has been shown in the thermoelastic martensite of shape memory alloys that the pairing of martensitic plates is also governed by the compatibility at the junction plane between the plates. An interesting result in steel is that butterfly-type pairing appears even in the early stage of transformation in all four morphologies, despite low compatibility. The universal character of the four morphologies of martensite is discussed in terms of geometrical compatibility of variant-pairing.