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Acoustic studies of the martensite phase transition in Ti-Ni alloys

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Acoustic studies of elastic properties and attenuation of ultrasonic waves (longitudinal and transverse) at the martensite phase transition were carried out in the Ti-Ni based polycrystalline alloys. Measurements were carried out using a pulse ultrasonic technique within a temperature range of 190 to 440 K upon continuous warming and cooling the samples after various hardening and annealing treatment. Anomalies of ultrasound velocity and attenuation were observed through the martensite phase transition which depended on wave polarization and thermal history of the samples, peaks of attenuation were seen only for transverse waves. A pronounced thermal hysteresis of acoustic features was also observed upon warming and cooling. The obtained results were treated on the basis of the phenomenological Landau theory for the B2-B19' ferroelastic phase transition.