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Weak shock waves and shear bands in thermoelastic solids. (English) Zbl 1171.74028

Acta Mech. 207, No. 3-4, 211-222 (2009).

Summary: The linear weak shock wave (acoustic wave) propagation and the existence of shear bands are examined in finitely deformed thermoelastic solids within the framework of the theory of singular surfaces. The jumps of certain field variables across the shock wave front are obtained by using Taylor series expansions, and the propagation condition is obtained by using a strain-energy function corresponding to Duhamel-Neumann expression. We determine the propagation speeds of weak shock waves for a particular state of deformation and for general dilation. The formation of shear bands and the magnitudes of critical stretches are obtained for uniaxial and biaxial extensions and for uniform dilation.

MSC:

74J40 Shocks and related discontinuities in solid mechanics

74F05 Thermal effects in solid mechanics

74B20 Nonlinear elasticity

Cited in **3** Documents

Keywords:

theory of singular surfaces; Taylor series; strain-energy function

Full Text: [DOI](#)

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