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Weak shock waves in isotropic solids at finite temperatures up to the melting point. (English)

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Summary: Propagation speeds and Rankine-Hugoniot relations for weak shock waves in isotropic solids are derived analytically in order to elucidate mechanical and thermal properties of the waves. In the analysis, we adopt a new continuum model for the solids, which takes into account explicitly microscopic thermal vibration of the constituent atoms. As the model is valid in a wide temperature range up to the melting point, we can discuss the relations at high temperatures even near the melting point. Typical numerical results are also shown and discussed as illustrations.

MSC:

74J40 Shocks and related discontinuities in solid mechanics
74F05 Thermal effects in solid mechanics
74A15 Thermodynamics in solid mechanics

Keywords:

Rankine-Hugoniot condition; weak shock waves isotropic solids; thermal effects; entropy production

Full Text: DOI

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