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Nonlinear Waves in Shock-Loaded Solids

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We consider evolution of nonlinear waves generated by a shock loading of elastoplastic solid. In many cases of interest the stress amplitude is small in comparison with the bulk modulus but exceeds considerably the elastic limit for most metals. Therefore, a set of small parameters can be defined and the asymptotic methods known may be extended to these problems. As a result a system of the approximate independent nonlinear equations belonging to different directions of longitudinal characteristics is obtained. On the basis of the equations proposed we consider the following problems: self-action of a shock wave when it reaches a free-surface of an elastoplastic plate; propagation of two-dimensional shock wave, generated by detonation of explosive located on the metal half-space; simulation of two-dimensional damage of a plane plate loaded by normal impact of a cylindrical impactor with the velocity of 200 m/s. A comparison with experimental data is conducted.

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