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Waves of Deformation Propagation in Nonlinear Viscously Elastic Porous Material

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A mathematical model of a firm porous material is studied. Material is supposed isotropic, viscidly elastic. Cavities are assumed spherical; distance between cavities is much greater than radius of cavities and much smaller, than length of a wave. Pressure in cavities is neglected. The analysis of the equations of longitudinal wave propagation has shown, that the consequences of the existence of cavities are dispersion of a wave, the frequency-dependent damping and an additional non-linear component (so-called cavitary non-linearity). These factors are not equivalent, and in different situations one of them prevails. Influence of dispersion, dissipation and non-linearity on behavior of waves in the medium was evaluated. The propagating wave is influenced by both dispersion and non-linearity. The combined effect of these two factors can be a reason for forming a non-linear stationary wave of deformation. Dependencies between the parameters of the soliton and porosity of the material have been established.

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