SM11S_11403

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Cubically Nonlinear Waves in Structured Materials of Macro-, Micro- and Nanoscale

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Last two years authors are actively analyzing the cubically nonlinear waves in elastic materials with internal structure. This analysis can be divided into a few steps. 1. We started with the statement of the problem, for this type of waves was ignored up to now by mechanicians despite of well study of the cubically nonlinear waves in physics. 2. Then some reasons for these waves studying were produced, including simplicity of transition from conventional in mechanics of materials quadratically nonlinear waves to cubically ones and the new possibilities of wave analysis – quadruples (four waves interaction), for instance. 3. Within the framework of cubic nonlinearity, many new wave effects can be predict-ted and described. These predictions were formulated and commented. 4. Some of new effects were theoretically and numerically analyzed for plane waves. For example, new schemes of wave profile evolution were detected. These steps will be explained in the paper.

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