THE INVERSE PROBLEM OF DYNAMICS FOR THE NONLINEAR KLEIN-GORDON EQUATION. PULSONS AND BUBBLES IN THE MODELS WITH LOGARITHMIC NONLINEARITIES

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We review the results on the inverse problem of dynamics for the nonlinear Klein-Gordon equation in n+1 dimensions [1-3].

First, we formulate a theorem, which gives the procedure of reconstruction of nonlinearities from a given rotationally-invariant scalar field distribution. As an illustration, all power nonlinearities corresponding to a certain class of spatially-localized time-dependent algebraic solutions are constructed. Some other wave equations having spherically-symmetric soliton solutions with finite energy are also obtained.

Further, we demonstrate that the logarithmic nonlinearity is the only one, which admits the real solutions in the form of solitons with oscillating amplitude. The structure of these multidimensional pulsating solitons (pulsons) is investigated. We also construct wave equations having solutions in the form of expanding bubbles.

Finally, the results of the numerical experiments [4] on collisions of the pulsons are discussed.

References

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