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A new class of self-similar solutions of the Landau-Lifshitz equation for a spin wave in a two-sublattice antiferromagnet.

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KEY WORDS: Spin wave, antiferromagnet, self-similar solution.

In the paper, spin waves in a uniaxial two-sublattice antiferromagnet are investigated. A new class of self-similar solutions of the Landau-Lifshitz equation is obtained and, therefore, a new type of spin waves is described. Different types of solution are obtained for the cases when the spin wave speed v exceeds the characteristic speed c defined by the antiferromagnet parameters and when $v<c$ (for $v=c$, no solutions of the described type are possible). Examples of solutions of the found class are presented. New type of solution admits both linear and non-linear spin waves, including solitons. Space transformations used for finding of the above-mentioned solutions are mathematically analogous to the relativistic space transformations, with the above-mentioned characteristic speed playing role of the speed of light.

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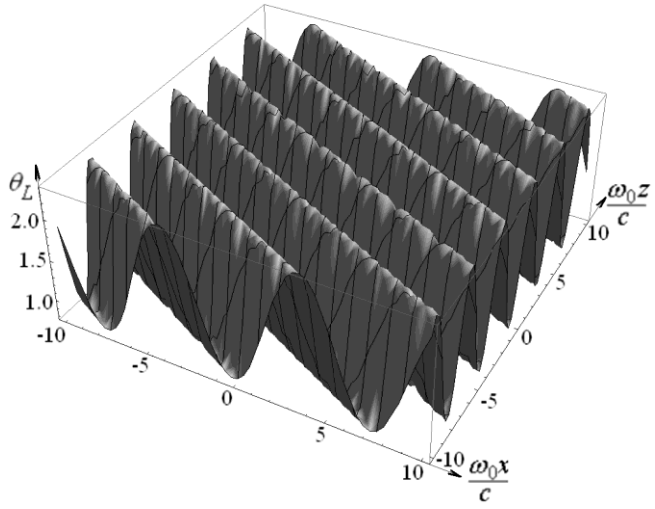

Dependence of the azimuthal angle for the antiferromagnetic vector θ_L on the dimensionless coordinates for an example for the described spin waves class for the time $t=c/\omega_0 v$. Here x, z are the Cartesian coordinates, c is the above-mentioned speed defined by the antiferromagnet parameters and ω_0 is the wave frequency.