

# Exactly solvable mathematical models in nonlinear optics

*I.V. Alimenkov<sup>1</sup>*

<sup>1</sup> *Samara State Aerospace University named after academician S.P. Korolev*

## **Abstract**

Exact three-dimensional solutions of nonlinear differential equations are obtained that describe the propagation of linearly polarized optical radiation in a nonlinear isotropic dielectric in various approximations. It is shown that the obtained three-dimensional solutions contain the known two-dimensional solutions, as a special case.

**Keywords:** nonlinear optics, mathematical model, differential equations, isotropic dielectric.

**Citation:** Alimenkov IV. Exactly solvable mathematical models in nonlinear optics. *Computer Optics* 2005; 28: 45-54.

[Access full text \(in Russian\)](#)

## **References**

- [1] Landau LD, Lifshitz EM. *Electrodynamics of continuous media*. 2<sup>nd</sup> ed. Oxford: Pergamon Press Ltd; 1984.
- [2] Takhtadzhyan LA, Faddeev LD. *The Hamiltonian method in the theory of solitons* [In Russian]. Moscow: Nauka Publisher, 1986.
- [3] Dodd RK, Morris HC, Eilbeck JC, Gibbon JD. *Soliton and nonlinear wave equations*. London, New York: Academic Press Inc; 1982.
- [4] Newell AC. *Solitons in mathematics and physics*. Philadelphia, PA: Society for Industrial and Applied Mathematics; 1985.
- [5] Rajaraman R. *Solitons and instantons: An introduction to solitons and instantons in quantum field theory*. New York: Elsevier Science BV; 1982.
- [6] Dwight GB. *Tables of integrals and other mathematical data*. 4<sup>th</sup> ed. The Macmillan Company; 1961.
- [7] Stepanov VV. *Course of differential equations*. Moscow: State Publishing House of Technical and Theoretical Literature; 1953.