

## SOME PARTICULARITIES OF SOLITONS PROPAGATION. COMPUTER SIMULATIONS USING MAPLE PROGRAMS

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**Rezumat.** *Articolul de față prezintă unele rezultate numerice ale simulării propagării solitonilor, bazate pe ecuațiile Korteweg-de Vries (KdV) și sine-Gordon, utilizând Maple 12, un program puternic, ce permite realizarea calculelor numerice, trasarea și animarea reprezentărilor grafice 2D și 3D, modificarea parametrilor, operarea cu expresii analitice. Simulările numerice arată propagarea soluțiilor multisolitonice în fibre optice neliniare, dispersive. Autorul evidențiază un posibil fenomen legat de recepționarea datelor și un artefact numeric. Aceste simulări au fost gândite pentru a reprezenta o bază teoretică necesară atât proiectanților din domeniul transmisiei de date cât și studenților, pentru o mai bună înțelegere a fenomenelor.*

**Abstract.** *This paper presents some interesting numerical simulations of multisoliton propagation, based on the Korteweg-de Vries (KdV) and sine-Gordon equations, using a powerful PC program (Maple12) which allows performing numerical calculations, plotting and animate 2D and 3D functions, varying parameters and managing analytical expressions. The numerical simulations show the multisoliton propagation in a nonlinear dispersive medium. The author shows a possible phenomenon connected with the data reception and a numerical artifact. These simulations are thought to represent a necessary theoretical background both for the designers working in digital data transmission and students, for a better understanding of those phenomena.*

**Key words:** computer simulations, Maple12, solitons, numerical artifacts

### 1. Introduction

The development of the optical communications began in the early 1960's and continues strongly today; among the inventions that have contributed to the progress of the optical communications the following must be considered as *milestones*: the invention of the LASER (1950's), the development of low loss optical fibers (Corning Optical Fiber, part of Corning's Telecommunications, 1970's), the invention of the optical fiber amplifier (e.g. erbium-doped fiber amplifier, semiconductor optical amplifiers 1980's), the invention of the in-fiber Bragg grating (see [1, 2], 1990's), and also the solitonic transmission of data (1990's).

In the last years, many authors - using different methods and computer programs to simulate various types of solitons - were able to predict some new types of solitons and some interesting features of solitonic propagation [3-9].

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