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Nonlinear PDE as Immersions

Abstract

Investigating of the nonlinear PDE including their geometric nature is one of the topical problems. With geometric point of view the nonlinear PDE are considered as immersions. We consider some aspects of the simplest soliton immersions in multidimensional space in Fokas-Gelfand's sense [1]. In (1+1)-dimensional case nonlinear PDE are given in the condition

$$A_t - B_x + [A, B] = 0, \tag{1}$$

where A is 3×3 prescribed matrix, B is expressed by elements of the matrix A, $[A, B] = AB - BA$. Nonlinear PDE (1) are compatibility condition some system of linear equations [2]. In this case there is a surface with immersion function. We find the second quadratic form in Fokas-Gelfand's sense associated to one soliton solution of nonlinear Schrodinger equation.

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