On surface associated to onesoliton solution of nonlinear Schrodinger equation

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Some exact solutions of partial differential equations are crucial issues for investigation both mathematical and physical points of view. Different kinds of physically interesting solutions as solitons, dromions, skirmions, monopoles, lamps are well known. Also soliton solution have simple behavior in bumping and are stable. There are various methods for searching of these exact solutions.

We consider nonlinear Schrodinger equation

$$i\psi_t + \psi_{xx} + 2\beta|\psi|^2\psi = 0,$$

where $\beta = +1,\ \psi$ is complex function. And onesoliton solution of this equation in the case of finite density

$$q(x,t) = \rho \frac{1 + e^{i\theta} exp\{\nu_1(x - vt - x_0)\}}{1 + exp\{\nu_1(x - vt - x_0)\}},$$

where $v = -\omega cos\frac{\theta}{2}$, $x_0 = \frac{1}{\nu_1} lni\gamma_1;\ \ \omega, \theta, \gamma_1, \nu_1$ are some parameters of the model.

We construct a surface corresponding to the onesoliton solution of the equation through the first and second quadratic forms in Fokas-Gelfand sense. Gaussian and mean curvatures of the surface are found.

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