Novel Excitations of the Nonlinear Schrödinger Equation by Separation of Variables

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By means of an extended tanh method, a new type of variable separation solutions with two arbitrary lower-dimensional functions of the (2+1)-dimensional nonlinear Schrödinger (NLS) equation is derived. Based on the derived variable separation excitation, some special types of localized solutions such as a curved soliton, a straight-line soliton and a periodic soliton are constructed by choosing appropriate functions. In addition, one dromion changes its shape during the collision with a folded solitary wave.