

Soliton Surfaces for the (1+1)-Dimensional Schrödinger-Maxwell-Bloch Equation

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ABSTRACT

Surface theory in three-dimensional Euclidean space is widely used in different branches of science, particularly theoretical physics (soliton theory, string theory, general theory of relativity), mathematics (differential geometry, topology, Partial Differential Equations (PDEs)), and biology. Soliton equations play a crucial role in the construction of surfaces. The surface theory is studied in both directions: from geometry to solitons and from solitons to geometry. In this work, we study the (1+1)-dimensional Schrodinger-Maxwell-Bloch equation (SMBE), which describes the optical pulse propagation in an erbium-doped fiber. We derive the first, second fundamental forms and the area of surface for the (1+1)-dimensional SMBE.