RING-LIKE VORTICES IN A LOGARITHMIC GENERALIZED MAXWELL THEORY

XIII Encontro de Pesquisa e Pós-Graduação

Francisco Cleiton EstevÃo Lima, Carlos Alberto Santos de Almeida

Since 1976, when Bogomol’nyi in his seminal paper discussed an innovative way for the stability of classical solutions, the study of topological defects has attracted the attention of several researchers. Indeed, topological structures have aroused a broad interest because these solutions can be used to represent particles and cosmic objects, such as cosmic strings. Several approaches to the study of defects have been applied in recent years to various systems. The large amount of works dedicated to the theme is due to the fact that each model presents a different dynamic depending on how the fields can be coupled. In this way, the study of topological defects that describe particles and cosmic objects helps everyone to understand a little more about the universe around us. In this work, we investigate the presence of vortex structures in a Maxwell model with a logarithmic generalization. This generalization becomes important because it generates stationary field solutions in models that describe the dynamics of a scalar field. In this work, we will choose to investigate the dynamics of the complex scalar field with the gauge field governed by the Maxwell term. For this, we will investigate the Bogomol'nyi equations to describe the static field configurations. Then, we show numerically that the complex scalar field solutions that generate minimum energy configurations have internal structures. Finally, assuming a planar vision, the magnetic field and the density energy show the interesting feature of the ring-like vortex.

Palavras-chave: Extended classical solutions. Gauge field theories. Field Theories in dimensions o. Bogomol'nyi equatio.