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2D NOVEL STRUCTURES ALONG AN OPTICAL FIBER

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Abstract. Bu using spectral methods, we present seven classes of stable and unstable structures that occur in a dissipative media. By varying parameters and initial conditions we find ranges of existence of stable structures (spinning elliptic, pulsating, stationary, organized exploding), and unstable structures (filament, disorganized exploding, creeping). By varying initial conditions, vorticity, and parameters of the equation, we find a reacher behavior of solutions in the form of creeping-vortex (propellers), spinning rings and spinning "bean-shape" solitons. Each class differentiates from the other by distinctive features of their shape and energy evolution, as well as domain of existence.

1. Introduction

Such as the nonlinear Schrödinger equation (NLSE), the **complex cubic-quintic Ginzburg-Landau equation** (CCQGLE) is one of the most intensively studied equation describing weakly nonlinear phenomena in dissipative systems [3]. Thus, much work has been done about the features and the properties of this equation as well as its numerous applications such as nonlinear waves, superconductivity, superfluidity [6], Bose-Einstein condensation, Bénard convection [1] and nonlinear optics [7].
Solitary waves (or solitons) are self localized solutions of certain nonlinear PDEs describing the evolution of a dissipative system [8]. Whereas traditional solitons are stationary in time and preserve their shape upon interaction, some dissipative soliton solutions of the CCQGLE are non stationary. In Hamiltonian systems, stationary solitons exist as a result of a balance between diffraction/dispersion and