Effect of the Random Field on the Dynamics of Pulsating, Erupting, and Creeping Solitons in the Cubic-Quintic Complex Ginzburg-Landau Equation

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Z. Naturforsch. **61a,** 615 – 623 (2006); received November 11, 2006

It is shown that the dynamics of pulsating, erupting, and creeping (PEC) solitons obtained from the one-dimensional cubic-quintic complex Ginzburg-Landau equation can be drastically modified in the presence of a random background field. It is found that, when the random field is applied to a pulse-like initial profile, multiple soliton trains are formed for the parameters of the pulsating and erupting solitons. Furthermore, as the strength of the gain term increases, the multiple pulsating or erupting solitons transform into fixed-shape stable solitons. This may be important for a practical use such as to generate stable femtosecond pulses. For the case of creeping soliton parameters, the presence of the random field does not generate multiple solitons, however, it induces a rapidly twisting or traveling soliton with a fixed-shape, of which stability can be also controlled by the gain term. – PACS numbers: 42.65.Tg, 03.40.Kf, 05.70.Ln, 47.20.Ky.

Key words: Pulsating, Erupting, and Creeping Solitons; Random Field; Fixed-Shape Soliton.