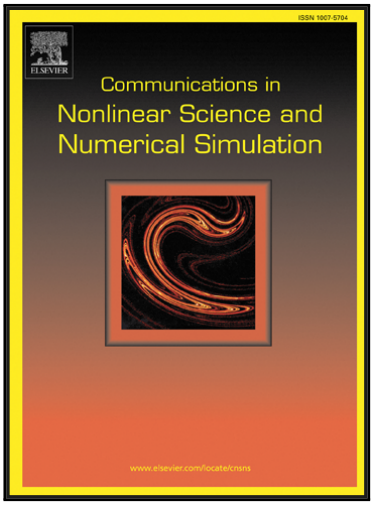

Dissipative optical bullets modeled by the Cubic-Quintic-Septic Complex Ginzburg-Landau Equation with higher-order dispersions

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Highlights

- We have derived a new equation modeling the propagation of ultrashort optical solitons in doped optical fiber, named the Higher-Order (3+1)D cubic-quintic-septic complex Ginzburg-Landau [(3+1)D CQS-CQL] equation, including sixth-order dispersion, self-steepening and Raman terms.
- Using variational approximation with the most popular Gaussian pulse shape, and the fourth Runge-Kutta method for solving the resulting equations, we have predicted the 3D spatiotemporal optical dissipative solitons from the [(3+1)D CQS-CQL].
- A fully direct numerical simulation of the [(3+1)D CQS-CQL], using the split-step Fourier method has revealed a good agreement between analytical and numerical treatments. It also reveals the balance between gain and losses, interplay between dispersion, diffraction and nonlinearities.
- Under certain parameter values, we have obtained the bell-shaped dissipative light bullets, double, triple and quadruple bullet complexes for anomalous, zero and normal chromatic dispersion regimes.