Contributed Talk

Dynamics of Nonlinear Waves in Electrical Transmission Lines

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In this talk, we discuss the dynamics of nonlinear waves in electrical transmission lines by deriving the governing circuit equations using Kirchhoff's law. By incorporating different forms of nonlinear capacitance and applying appropriate perturbation methods and scaling, we derive various nonlinear integrable systems, including the Korteweg-de Vries equation, nonlinear Schrödinger equation, and Kundu-Eckhaus equation. These equations admit different types of nonlinear wave phenomena, from which we obtain four types of solutions: solitons, rogue waves, breathers, and positons. Analyzing these waveforms within the context of electrical transmission lines provides valuable insights into their propagation, stability, and energy localization. This research not only enhances our theoretical understanding but also offers a framework for interpreting experimental data, contributing to the design and optimization of electrical transmission systems.

References

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