Ultra-Fast Fiber Lasers: Principles and Applications with MATLAB® Models (Optics and Photonics)

Le Nguyen Binh, Nam Quoc Ngo

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Ultrashort pulses in mode-locked lasers are receiving focused attention from researchers looking to apply them in a variety of fields, from optical clock technology to measurements of the fundamental constants of nature and ultrahigh-speed optical communications. Ultrashort pulses are especially important for the next generation of ultrahigh-speed optical systems and networks operating at 100 Gbps per carrier.

Ultra Fast Fiber Lasers: Principles and Applications with MATLAB® Models is a self-contained reference for engineers and others in the fields of applied photonics and optical communications. Covering both fundamentals and advanced research, this book includes both theoretical and experimental results. MATLAB files are included to provide a basic grounding in the simulation of the generation of short pulses and the propagation or circulation around nonlinear fiber rings. With its unique and extensive content, this volume?

- Covers fundamental principles involved in the generation of ultrashort pulses employing fiber ring lasers, particularly those that incorporate active optical modulators of amplitude or phase types
- Presents experimental techniques for the generation, detection, and characterization of ultrashort pulse sequences derived from several current schemes
- Describes the multiplication of ultrashort pulse sequences using the Talbot diffraction effects in the time domain via the use of highly dispersive media
- Discusses developments of multiple short pulses in the form of solitons binding together by phase states
- Elucidates the generation of short pulse sequences and multiple wavelength channels from a single fiber laser

The most practical short pulse sources are always found in the form of guided wave photonic structures. This minimizes problems with alignment and eases coupling into fiber transmission systems. In meeting these requirements, fiber ring lasers operating in active mode serve well as suitable ultrashort pulse sources. It is only a matter of time before scientists building on this research develop the practical and easy-to-use applications that will make ultrahigh-speed optical systems universally available.

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