

Non-reciprocal devices in fiber optic communication systems



Overview

Nonreciprocal optical devices, allowing transmission of light with different efficiencies in opposite directions, are key elements for modern optical communication and even quantum information technologies, but elusive to be integrated on a chip to date. Such devices exploring nonlinearity can. Faraday circulators (or less specifically optical circulators) are a kind of non-reciprocal optical devices. They are technically related to Faraday isolators, and on a broader scale similar to electronic circulators. Typically, a circulator has three or four optical ports (inputs / outputs). Optical nonreciprocity is of fundamental importance for signal processing in modern optical communication systems. An all-fiber device, containing two mutually coupled Fabry-Perot (FP) resonators to realize broken parity-time (PT) symmetry, is demonstrated to achieve nonreciprocal light. Lightwave systems, including fiber optic and integrated optic, are becoming more and more complex, new function blocks (or components) and networking strategies are very important for future highly integrated lightwave circuits. Nonlinear effects arise from either the intensity-dependent refractive index of fiber (the Kerr effect) or from inelastic scattering.

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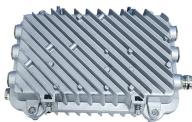
We proposed an approach to implement nonreciprocal light transmission in an all-fiber device with a remotely switchable isolation direction, a tunable isolation ratio and a tunable ...



The primary contributions of this dissertation are the study of common nonreciprocal optical effects and demonstration of several basic applications to fiber components and fiber metrology systems.



Optical circulators are non-reciprocal devices that direct light from one port to another in a specific order, typically in a cyclic manner. They are crucial components in modern optical ...



Explore the cutting-edge world of non-reciprocal optical devices, their role in advancing optical technologies, and the latest breakthroughs shaping the future.



A few typical applications of fiber-optic Faraday circulators are briefly explained in the following: One can integrate a reflective fiber-optic component, e.g. a fiber Bragg grating, into a fiber-optic light path (see ...



A reflective all-fiber optical current transformer based on a spatial non-reciprocal phase modulation technique is investigated by theoretical analysis ...



While this study focuses on comparing DS-NRPPS-IFOG with traditional DS-IFOG systems, the proposed non-reciprocal passive biasing mechanism shows promising applicability in ...



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Nonreciprocal light transmission in an all-fiber platform is critical in modern optical communication systems, which can avoid the packaging and integration process required in current...



A reflective all-fiber optical current transformer based on a spatial non-reciprocal phase modulation technique is investigated by theoretical analysis and experimental measurement.



This paper provides an overview of nonlinear optical effects in fiber-optic communication, focusing on key phenomena and their impact in telecommunication systems.

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