Optical Temporal Reflection Coupler



Overview

Temporal coupled-mode theory (CMT) is a powerful theoretical tool in the field of optics and photonics, allowing to efficiently analyze and design resonant systems, as well as to probe the physics of (nonlinear) cavities, their mutual coupling, and the exchange of energy with. Temporal coupled-mode theory (CMT) is a powerful theoretical tool in the field of optics and photonics, allowing to efficiently analyze and design resonant systems, as well as to probe the physics of (nonlinear) cavities, their mutual coupling, and the exchange of energy with. Chenyu Liu 1, Bing Wang 1,*, Shulin Wang 1,2, Lange Zhao 1, Zhuoxiong Liu 1, Xinyuan Hu 1, Yinglan Li 1, Haojin Ma 1, Jiahua Li 1 et al. Applied 24, 014040 – Published 22 July, 2025 DOI: https://doi. 1103/vnff-cy63 Here we experimentally create a temporal waveguide doublet by. resembles what happens at spatial boundaries, but is in fact fundamentally different. Namely, homogeneous medium conserves momentum (wavevector). This means that the time-refracted and time-reflected waves experience a frequency shift at the time-interface. Moreover, because resembling a video. ance for optical resonators, based on a temporal coupled-mode formal-ism. We show that the coupling constants in such a theory are strongly con trained by energy-conservation. This review focuses on phenomena such as temporal reflection, total internal reflection, and waveguiding from ultrashort solitons forming inside a nonlinear dispersive medium such as an optical fiber. He was awarded a Horton Fellowship in 2023. Temporal reflection. Temporal coupled-mode theory (CMT) is an acclaimed and widely used theoretical framework for modeling the continuous-wave response and temporal dynamics of any integrated or free-space photonic resonant structure.

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Article Content

Nonlinear manipulation of optical coupling in synthetic temporal ...

Here we experimentally create a temporal waveguide doublet by introducing truncation boundaries in a synthetic temporal lattice, which is constructed using two fiber loops connected by a

About Time: Observation of Time-Reflection at Optical Frequencies

However, time-reflection of EM waves was thus far observed only at RF frequencies, never at optical frequencies. This is because time-reflection requires an order-unity variation of the

Raman soliton-induced time focusing and time-convex mirror in

Temporal reflection can lead to the focusing, defocusing, or collimation of optical pulses. Here, a method is proposed for manipulating optical pulse characteristics using time surface mirrors.

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multiple input and output ports through a single-mode optical resonator. The theory incorporates the effects of both direct and indirect pathways and is thus applicable to any single-mode resonator struct

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This review focuses on phenomena such as temporal reflection, total internal reflection, and waveguiding from ultrashort solitons forming inside a nonlinear dispersive medium such as an

Temporal Reflection of Optical Pulses on a Moving Boundary

In this chapter, I provide the theoretical background of the phenomenon of temporal reflection, as well as suitable models for studying the propagation of pulses in optical fibers, which are used as a platform

Temporal coupled-mode theory in nonlinear resonant

In this Tutorial, we thoroughly present the basic principles and the evolution of CMT throughout the years, showcasing its immense capabilities for

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Edge Coupler Simulations | gcharalampous/lumerical-py-scripts

Edge couplers provide optical mode conversion between the small mode field diameter of integrated waveguides and the larger mode field of optical fibers. The simulations calculate

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The coupling ratio is calculated from the measured insertion loss. Coupling ratio (in %) is the ratio of the optical power from each output port (ports 2 and 3) to the sum of the total power of both output ports

Temporal coupled-mode theory in nonlinear resonant photonics: From ...

In this Tutorial, we thoroughly present the basic principles and the evolution of CMT throughout the years, showcasing its immense capabilities for the analysis and design of linear and

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A grating coupler having asymmetric grating trenches for low back reflections is experimentally demonstrated. Conventional and asymmetric-trench grating couplers have been

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Optical couplers are one of the most important classes of integrated optical components. These devices are used in directional routing of a light signal from one waveguide to another or in

Temporary Optical Coupler for Optical Cable Re

We design a temporary optical coupler to obtain high injection and extraction efficiencies while keeping the bending loss low with the aim of

Reflection and refraction at a time boundary

After a specified time tc, the strength and sign of the coupling between neighbouring momentum states is rapidly changed, by means of fast acousto-optic modulators, which results in an

Temporal Reflection of Optical Pulses on a Moving Boundary

I studied the temporal reflection''s dependence on the moving boundary''s properties and proposed several interesting phenomena, such as a temporal analog of focusing and collimation for optical

Efficient coupling to an optical resonator by exploiting time-reversal ...

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After transmission through an optical fibre, two lenses and a pinhole are used for spatial mode matching of the beam to the resonator. The detection of the cavity reflection is enabled by the

Optimization of the reflection in the optical coupling between high ...

Abstract The optical coupling in silicon Photonic Integrated Circuits (PICs) remains one of the main topics in the improvement of the performance of these devices. Highly demanding

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