

Variation of speckle in multimode fiber over time



Overview

Using a conventional semiconductor laser and a multimode optical fiber we study experimentally how the speckle pattern depends on the laser pump current and on the image acquisition settings. During multimode fiber (MMF)-based information transmission, strong and persistent external disturbances can readily induce mode coupling, significantly degrading image reconstruction and posing major challenges for practical applications. To ensure stable transmission, this paper analyzes mode. In this work, we present an alternative fiber-optic vibration sensing strategy that harnesses a multimodal architecture combining speckle and polarization interrogation. The experimental results demonstrate the concept by achieving speckle-based signal source localization with centimeter-range. The speckle patterns, segmented by three methods of segmentation, as Centering (1), Quartering (2) and Surrounding (3), are reconstructed into input images by Complex Artificial Neural Network (CANN). Plastic optical fibers are used in this work due to its excellent flexibility and adaptability to build sensor heads. Here, we show that by tracking the evolution of,

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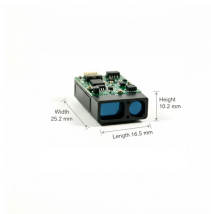
We examine how these algorithms perform when analyzing speckle patterns from a polymer optical fiber exposed to variations in both refractive index and pressure.



In this study, under transverse displacement or oscillatory disturbances, an overall rotation of speckle patterns—along with local minor random variations—was observed in step-index ...



In reference 16, researchers utilized deep learning to extract invariant fiber characteristics from speckle patterns of different fiber configurations, enabling image transmission through a ...



We introduce a deep-learning technique to perform complete mode decomposition for few-mode optical fibers for the first time. Our goal is to learn a fast and accurate mapping from near-field...



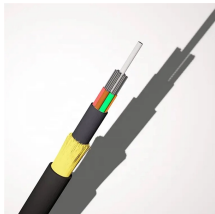
In summary, we presented a multimode fiber based dynamic strain sensor that uses the evolution of the backscattered speckle pattern to extract a linear strain response.



In this work, we present an alternative fiber-optic vibration sensing strategy that harnesses a multimodal architecture combining speckle and polarization interrogation.



Multimode fibers (MMF) have been extensively investigated for transmitting images. The transmitting images are distorted into speckle patterns by MMFs, which can be reconstructed by ...



Here we use a multimode semiconductor laser and a multimode fiber to generate speckle patterns and analyze how the amount of speckle depends on the laser current.



We experimentally demonstrate the feasibility of an original space division multiplexing technique based on the classification of speckle patterns measured at the fiber's output.



Here we use a multimode semiconductor laser and a multimode fiber to generate speckle patterns and analyze how the amount of speckle depends on the laser ...



This paper proposes the characterization of speckle patterns of multimode fibers in view of sensing applications and particularly for detection of vibration or seismic activity.

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