

Advances in Fiber Optic Technology for High-Speed Data Transmission

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Abstract : Fiber optic technology has revolutionized telecommunications and data transmission, providing unmatched speed, bandwidth, and reliability. This paper presents the latest advancements in fiber optic technology, focusing on innovations in fiber materials, transmission techniques, and network architectures that enhance the performance of high-speed data transmission systems. Key advancements include the development of ultra-low-loss optical fibers, multi-core fibers, advanced modulation formats, and the integration of fiber optics into next-generation network architectures such as Software-Defined Networking (SDN) and Network Function Virtualization (NFV). Additionally, recent developments in fiber optic sensors are discussed, extending the utility of optical fibers beyond data transmission. Through comprehensive analysis and experimental validation, this research offers valuable insights into the future directions of fiber optic technology, highlighting its potential to drive innovation across various industries.

Keywords : fiber optics, high-speed data transmission, ultra-low-loss optical fibers, multi-core fibers, modulation formats, coherent detection, software-defined networking, network function virtualization, fiber optic sensors

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