



University of Central Florida

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Compensate for Interference in Multimode Optical Fiber

UCF researchers have developed an alternative way to overcome interference associated with long-haul optical fiber transmission, a system and method for compensating using digital processing.

With growing demand for bandwidth, usability of current infrastructure and transmission techniques for long-haul optical communication is limited—the capacity of conventional systems based on the single-mode fiber (SMF) has almost reached the nonlinear Shannon limit. Few-mode fiber (FMF) offers a much larger effective area, and nonlinear impairments are reduced compared to SMF. Higher capacity for long-haul transmission is feasible in the fundamental mode of FMF, but this mode of operation is impaired by multi-path interference (MPI). Current means of reducing MPI eventually limit the effective area of FMF, limiting transmission capacity.

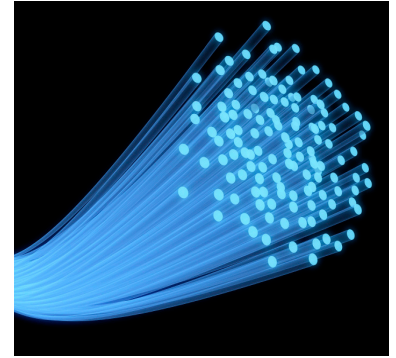
FMF and wavelength-division multiplexing can ideally increase capacity by a factor of the number of modes, but linear impairments such as differential mode group delay (DMGD) and mode coupling severely impact transmission performance. To lessen the negative effect of the impairments, multiple-input multiple-output (MIMO) equalization is needed, but it grows more computationally complex as DMGD increases, diminishing its practicality. While the computational complexity has been managed by applying time-domain equalization (TDE), but this is not feasible for long-haul MDM transmission.

Technical Details

This new method uses adaptive frequency-domain equalization (FDE) to reduce computational complexity compared to TDE, while maintaining performance. FDE enables more flexibility in fiber design, allowing a larger number of modes and larger effective areas, for higher capacity.

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Benefits

- Reduce computational complexity
- Enable higher capacity

Applications

- Long-haul optical transmission systems

Tech Fields

Optics & Lasers

Keywords

long-haul optical communication, few-mode fiber, FMF, multiple-input multiple-output, MIMO, time-domain equalization, TDE

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If you or your company are interested in this opportunity, Contact:

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