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Mode-division multiplexed transmission over few-mode fibers

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Mode-division multiplexing over few-mode fibers (FMFs) has been proposed as a next-generation solution to overcome the impeding installed capacity exhaustion of current single-mode fibers, with potential cost, space and energy savings. An *N*-fold capacity increase can be obtained using a few-mode fiber with *N* independent modes, since each mode can support the same amount of information of a single-mode fiber. However, there are some impairments arising from the multimode nature of few-mode fibres that have to be addressed to reach their full capacity: differential mode delay, linear mode crosstalk, mode-dependent loss and intermodal nonlinearities. Furthermore, a basic mode-division multiplexing system requires the design of new devices and sub-systems, namely: mode multiplexers, multimode amplifiers and multiple-input-multiple-output digital signal processing. In this talk, we will discuss the feasibility of using few-mode fibres and multiple-input-multiple-output digital signal processing for long-haul transmission, in experimental and theoretical terms. We will be focusing on the intermodal nonlinear interference and on the perforamance of multiple-input-multiple-output digital signal processing for the most signicant operating regimes regarding mode crosstalk and differential mode delay. Finally, we will shown how few-mode fibers can carry more information per mode than a single-mode fiber and at what cost.

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