Abstracts

Wave Coupling Between Parallel Single-Mode and Multimode Optical Fibers

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A directional coupler composed of a single-mode optical fiber and a multimode optical fiber has been considered to be capable of serving as a drop/insert device of a node in optical fiber Iocal area networks. It should couple almost all the local transmitter power into the multimode fiber bus, while removing only a small fraction of the optical power from the bus through the single-mode fiber. In this paper, the underlying fundamental process of the power transfer between two such optical fibers is analyzed utilizing a coupled-mode theory. Numerical calculations show that wave coupling among the guided modes on the fibers is quite complicated and that the wave amplitude variations along the propagation direction are different from the sinusoidal types resulting from two-mode coupling. The theoretical results do support the expected performance of the proposed couplers and provide an important guide for the design of such devices.

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