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Randomly-coupled multi-core fiber for long-haul optical MIMO transmission system

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The capacity of conventional single-mode fiber (SMF) that is widely used in the existing optical communication network is expected to be limited to around 100 Tbit/s owing to the non-linear effect of the optical fiber. Space division multiplexing technologies using multi-core fiber (MCF) or few-mode fiber have been investigated for overcoming the capacity crunch of conventional SMF. MCF has multiple cores within a cladding and multiple signals can be transmitted in parallel by using multiple cores. One important parameter for MCF is spatial density, namely the number of spatial channels per unit area, since the cladding diameter of the fiber is limited to a certain value in terms of mechanical reliability. Recently, coupled MCF which has a low core pitch value between the cores compared to the non-coupled MCF has been investigated with the aim of improving the spatial density. In this paper, we review recent progress on coupled multi-core fiber (MCF) technologies and advantages of using this type of MCF for optical MIMO transmission system. Finally we report our recent results for high spatial density randomly-coupled MCF with low modal dispersion characteristic, which is beneficial for realizing long-haul optical MIMO transmission.

Biography

Taiji Sakamoto received his BE, ME and PhD degrees in Electrical Engineering from Osaka Prefecture University, Osaka, Japan in 2004, 2006 and 2012 respectively. In 2006, he joined NTT Access Network Service Systems Laboratories, NTT, Ibaraki, Japan where he has been engaged in research on optical fiber nonlinear effects, low nonlinear optical fiber, few-mode fiber and multi-core fiber for optical MIMO transmission systems. He is a Member of the Institute of Electronics, Information and Communication Engineers.

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