Single-Dimensional Multiplexer Using Nano-pixel Structure for High-density and Flexible Mode-Multiplexing System

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Along with the Network Communications developing, the amount of network data-traffic keeps growing sharply. The data-traffic in the data center has been rapidly increasing especially. A lot of researchers are focused on the problem of the power consumption due to data-traffic increasing. Linearly polarized (LP) mode based multiplexing has been widely used in SDM long distance transmission experiments. But because of the mode degeneration and mode crosstalk, it's hard to realize more than 100 modes multiplexing, and required MIMO (multi-in multi-out) processing, which causes the Time-delay trouble in data-center. Several types of de-multiplexer have been made but, the maxim modes multiplicity of them is around 10 modes, which not enable making problem resolved substantially. As one way to overcome these issues, one possible solution is realizing Spatial multiplexing transmission in data center. To realize high modes multiplexing and high integration in the non-MIMO multimode transmission, we have studied a phase control type single-dimensional spatial mode de-multiplexer based on slab waveguide. The performance of the slab waveguide for single dimensional spatial mode is investigated in this work. With the support of the Python, and the algorithms in MOST module of RSOFT software, now it realizes continuously analyzing and relearning the internal structure of the slab waveguide, so as to continuously improve the structure in terms of data. Adjust the equipment experimentally to realize the ideal fabrication of coupling waveguides and limit size of the air hole exploration.

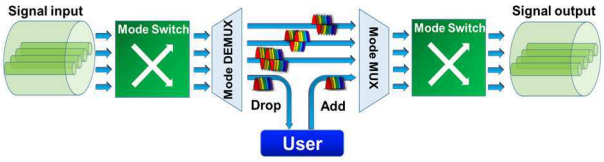

Fig. 1. the schematic of Mode-division Multiplexing

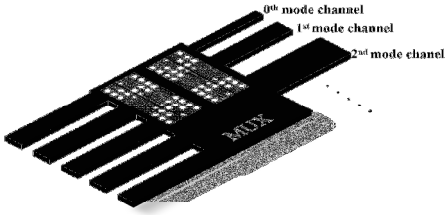

Fig. 2. Mode-division Multiplexer

Figure 2 shows the schematic of the light selective mode of de-multiplexer, which also is regarded as the slab waveguide region. Figure 3 shows the deep learning process and optimized Nano-pixel structure. To achieve this, the results of each simulation will import the data in Excel form into Python, combined the program to change the structure of the internal air hole, and then calculate the processed data group with MOST(Multi-Variable Optimization and Scanning Tool) module of RSOFT, finally get a good structural condition after repeated simulations.

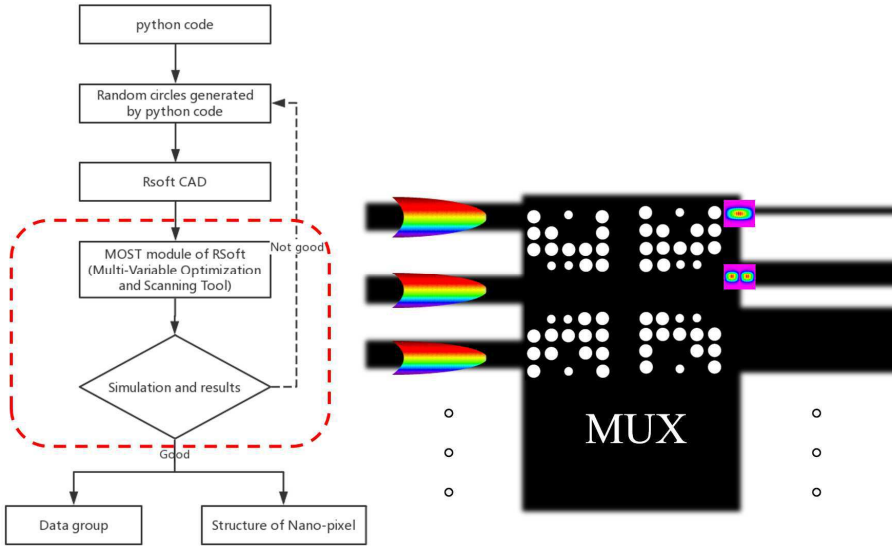

Fig. 3. the deep learning process and optimized Nano-pixel structure