Research of the Critical Values of SMF for Single Mode Propagation

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ABSTRACT

Nowadays SMF, single mode fiber, always has the function of single-mode propagation. But it still has a restriction on the usage of light source wavelength in fiber communication network. Based on the mentioned reasons, it is necessary to research the relationship of critical values in SMF on single-mode propagation. In this study, we tend to find a more convenient and economic method to manufacture a SMF or design a perfect fiber communication network. The parameters of an applied fiber-system structure are medium refractive indices of core and cladding, core radius and wavelength of light source. These are the four main influential parameters of normalized frequency, or called V-number, that must be satisfied by a very strict condition for single mode propagation. SMF is a fiber that satisfied the mentioned conditions above. It is obvious that multi-mode propagation would be happened in SMF when incorrect wavelength is used. In other words, the usage of light wavelength in manufactured SMF would be restricted. Multi-mode propagation will cause modal dispersion. It is the main loss factor in an optical transmission system. It will reduce the transmission rate and data capacity of optical network. So SMF plays a very important role because it can avoid causing multi-mode propagation. For the reasons as mentioned above, it is very important to research the relationship among the critical values of SMF. In this thesis, in order to keep SMF far away from causing multi-mode propagation we offer a researched final-result table in which the relationships among the critical values for single-mode propagation were included. Not only fiber manufacturers but also optical network designers can look up the table easily to get more data what they need.

Keywords : SMF、core radius、refractive indices、normalized frequency

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