OBTAINING THE UNKNOWN INDEX OF OPTICAL WAVEGUIDE BY USING GENETIC ALGORITHM BASED ON FINITE DIFFERENCE BEAM PROPAGATION METHOD

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In this paper we use FD-BPM to propagate a given incident field that launched in to geometry along the structure that is z-invariant. This wave can be expanded in the mode of this structure. We use only the dominant mode of structure. But the indexes of any regions in the optical waveguide are unknown. It means that we have unknown package. For defining the index of the structure we use genetic algorithm (GA) and finite difference beam propagation method (FD-BPM). At first, a given incident field are measured completely. After this measurement of initial field we propagate it a long the waveguide. Then, the field is reached to the end of waveguide. By detecting the final field and evaluate this field, we determine the number of regions and estimate the index of any regions. By using this initial assumption the GA will start to generate the indexes in any regions. In any generation of indexes, the once initial field launched in to a structure and is propagated along the structure by using FD-BPM. After detecting at the end of waveguide, it compares with the first one that stated above. After comparison and define the error between them, this process will be continued to define the index in any regions. We use this method for defining the distribution of index at the cross section of the waveguide. But in this manner the estimation of index distribution has been occurred at the first step. Comparison between final fields in any steps with the one at first helps to define the quantity of index distribution in any points. Thus, using this method helps to define the parameters of the unknown optical structure only by knowing the initial field as input of the system and the final field as out put of the system. Finally, we examine our solution for indexes of the structure with original one, and a good agreement has been found.

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