Multilayer optical filters are structures that affect the reflection, absorption, and transmission behavior of light at different wavelengths when interacting with light. Accordingly, optical filters can be designed that allow light to exhibit the desired behavior at certain wavelengths with different materials and arrays selected. Wavelength multiplexer systems (WDM) are systems that multiplex multiple optical carrier signals used in fiber-optic communication onto a single optical fiber using different wavelengths. In this study, the defined C band for DWDM systems in the 1530nm and 1565nm range was preferred due to its frequent use and low transmission attenuation loss, and an optical filter was designed for this band gap.

The filter layer arrangement was made according to the 2nd, 3rd, and 6th cell of Fibonacci sequence. An intermediate material is placed at the beginning of the 6th cell of the Fibonacci series used in the structure.

The properties of the materials used in the designed building and the general properties of the filter are presented in Table 1.

Transfer Matrix Method (TMM) was used for the reflected power ratio analysis of the structure [2].

For 3rd cell of the Fibonacci sequence total system matrix: $M_T = \left[ D_{31} D_{32} D_{31}^{-1} D_{11} P_1 D_{11}^{-1} D_{11} P_1 D_1 P_1 \right]$.

The optical filter and DWDM systems are designed with the help of the configuration tool developed with Python using the TMM method.

In Figure 2, the number of channels defined in the C band were obtained as 44, 58, 73 and 88, respectively. Likewise, the wavelength ranges of the channels defined in the C band are 0.806, 0.608, 0.491, 0.407nm, respectively.

Accordingly, the structure can be used as a new and adjustable filter in DWDM systems, which is an important part of current optical communication applications.

In addition, by changing the number of repetitions of the blocks used in the designed structure, DWDM filters can be designed in different wavelength ranges and different channel numbers in accordance with different ITU-T standards.

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