Graphene is a two dimensional nanomaterial of special interest due to their unusual electronic, mechanical, chemical, among other properties, which suggest a wide range of applications in optoelectronics, computer, ecology, etc. The study of the optical properties of graphene are important due of their potential applications such as ultrafast photonics, optical filters, lightweight/strong composite materials, photovoltaics and energy storage devices [1]. In this work we studied the reflection and absorption properties for a multilayer dielectric-graphene-dielectric system. The multilayer structure its building under the quasi-regular Period-Doubling sequence, which have the substitution rule given by $G(\Lambda) = \Lambda \Lambda$ and $G(\Omega) = \Lambda \Omega$, where $\Lambda$ means dielectric 1 ($\omega_1, ?_1$) media and $\Omega$ represents the dielectric 2 media ($\omega_2, ?_2$). The graphene sheets are intercalated between dielectric media. The optical response of graphene are introduced by the optical conductivity used by Falkovsky [2], which takes account the intraband and interband transitions. We use the transfer matrix method, like Pochi-Yeh, for obtain the absorption and reflection spectra. We obtain that the absorption and reflection spectra depends strongly with respect to the number of layers system, of the width of dielectric media (separation between graphene sheets), of the optical contrast, of the light incident angle. Furthermore, we calculate the spectra for both transverse magnetic (TM) and transverse electric (TE) polarization in the far infrared region. For each polarizations exist different spectral characteristics, which comes strongly of graphene sheets. On the other hand, it is important to note that the geometric characteristics of the sequence are reflected in the spectra, in addition to the formation of well-defined absorption bands above the cutoff frequency dimensionless $W=2$ ($W = \omega w/m$).

**Keywords:** graphene, optical properties, period-doubling

**References:**


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