

论文

FDTD方法分析THz波段金属平板的屏蔽特性

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摘要:

研究了室温下金属平板对THz波的透射屏蔽特性。考虑到THz波段金属电导率的频率色散特征,基于Z变换方法处理频域色散媒质本构关系到时域的转化,使FDTD仿真易于编程实现。仿真表明,对不同金属材料,其屏蔽效应随频率呈现出周期振荡,且金属平板厚度在百nm量级时对THz波的屏蔽效应>60 dB。对不同厚度的金属平板,其屏蔽效应以dB为单位随厚度线性增大,有望利用此特性实现厚度 $\mu<m$ 级薄层金属的厚度测量。

关键词: THz波;金属平板;色散模型;FDTD方法;屏蔽

Analysis of Shielding Characteristics of Metal Slab at THz Frequencies Using FDTD Method

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Abstract:

Considering the frequency dispersion of the metal conductivity at room temperature and THz frequencies,the shielding effectiveness of one-dimensional metal slab is investigated by the FDTD method.The constitutive equation of the dispersion medium is transformed from frequency domain to time domain by the Z-transform method effectively,which makes it easy to implement the FDTD simulations.The numerical results show that the shielding effectiveness increases with the frequency and oscillate periodically.In addition,the shielding effectiveness is greater than 60 dB for the metal slab with a thickness of hundreds of nanometers.The shielding effectiveness in the unit of dB is increasing linearly with the thickness of metal slab,which has potential applications in thickness measurement for the very thin metal slab.

Keywords: Terahertz waves;metal slab;dispersion model;FDTD method;shielding effectiveness

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扩展功能

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