

激光技术

偏振光大气传输的前向散射新模型

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摘要:

建立了偏振光空间传输前向散射的物理模型。对各向同性散射介质,在非相干性假设条件下,导出了偏振光双散射和多散射前向散射的有效Mueller矩阵,给出了偏振光Mie散射前向有效Mueller矩阵各矩阵元之间的对称性关系,即Mueller矩阵的16个矩阵元中只有7个是独立的,其他9个矩阵元通过组合及一定角度的旋转即可得到。利用Monte Carol方法模拟了偏振光在空间传输10 km的前向散射的有效Mueller矩阵,模拟结果表明各矩阵元存在一定的对称性关系,与基于本模型导出的偏振光前向散射的有效Mueller矩阵元具有较好的一致性。

关键词: 前向散射 Mueller矩阵 Monte carol方法 Stokes矢量

New forward scattering model for polarized light propagating in atmosphere

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Abstract:

A new physical model for forward scattering of a polarized light beam in atmosphere transmission was established. Based on incoherent light assumption, double and multiple forward scattering theories were derived. To the symmetrical system, the effective Mueller matrix of the forward scattering of polarized light was obtained. It is shown that only seven matrix elements are independent, nine matrix elements are obtained by rotating independent elements. To validate the scattering model, the effective Mueller matrix of the forward scattering of polarized light in 10km atmosphere transmission were simulated with Monte Carlo method, it is proved that theatrical and numerical results are in good agreement.

Keywords: scattering Mueller matrix Monte Carlo method Stokes vector

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