论文

部分相干电磁光束的光谱交叉偏振度

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摘要：

基于光谱交叉偏振度新理论，研究了部分相干光束在传输过程中光谱交叉偏振度的变化情况.采用相干偏振统一理论和广义惠更斯-菲涅耳原理，推导部分相干电磁高斯-谢尔模型光束在自由空间传输时任意空间两点的交叉谱密度矩阵的解析式.研究表明，光谱交叉偏振度的值不再仅仅局限在0~1之间，而是可为任意的非负值.传输场中的光谱交叉偏振度与光源相关参量，初始偏振度和传输距离紧密相关.当光束经过足够长的传输距离后，轴上光谱交叉偏振度不再发生变化，而是趋向一个稳定值.保持光谱交叉偏振度不变的条件与一般偏振度相同.

关键词：　部分相干电磁光束　光谱交叉偏振度　相干偏振统一理论　自由空间

he Spectral Degree of Cross -polarization of Stochastic Electromagnetic Beams

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Abstract:

Based on the theory of spectral degree of cross-polarization, the behaviour of spectral degree of cross-polarization of a electromagnetic Gaussian Schell-model beam on propagation is studied. The expressions for the elements of the cross-spectral density matrix the beam propagating in free space for arbitrary two points in the beam has been derived by using the unified theory of coherence and polarization and the extended Heygens-Fresnel integral. The results show that, the degree of cross-polarization of partially coherent electromagnetic beams in free space may take on any nonnegative values, in contrast to the usual degree of polarization which is restricted to the range 0~1.The behavior of the degree of cross-polarization on propagation is determined by all the parameters of the source radiating the beam. At sufficiently large distances from the source the degree of cross-polarization stabilizes for all points within the beam independently of their radial positions.The condition for keeping the degree of cross-polarization invariant is the same as that of the usual degree of polarization.

Keywords: Partially coherent electromagnetic beam   Degree of cross-polarization   Unified theory of coherence and polarization   Free space

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