

论文

空气中氧分子吸附作用对紫外光丝传输特性的影响研究

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摘要:

从麦克斯韦波动方程出发,得到了包含氧分子吸附作用等非线性效应在内的光束传输方程.将光束成丝与粒子在势阱中的运动联系起来,分析了光束在空气中形成稳定光丝的初始条件.用数值模拟的方法,研究了氧分子吸附作用在光丝传输过程中对光束尺寸、能量及相位的影响.结论表明:氧分子吸附作用对能量的消耗较大,造成振荡过程中光束尺寸的减小|定性解释了光丝传输过程中能量变化与光束尺寸的对对应关系.

关键词: 紫外光丝 光束尺寸 氧分子吸附 瑞利散射

The Effects of the Attachment of Oxygen on the UV Filament in Air

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Abstract:

From the Maxwell wave equation,the beam propagation equation,which includes several nonlinear effects,such as the attachment of oxygen,was obtained.The filamentation dynamics was homologous to the problem of particles moving in a potential well.The initial conditions in which the laser beam becomes a stationary filamentation were analyzed.By the numerical simulation,the influences of beam size,power and phase on the attachment of oxygen in the filament propagation were discussed.The conclusions indicate that the power is rather consumed by the attachment of oxygen,which results in the beam size decreasing in oscillation process.The results qualitatively explain the relationship between beam size and power.

Keywords: UV filament Beam size Attachment of oxygen Rayleigh scattering UV filament Beam size Attachment of oxygen Rayleigh scattering UV filament Beam size Attachment of oxygen Rayleigh scattering

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