

论文

不同波长的散射介质后向散射光偏振度特性

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摘要:

基于Stokes矢量,通过测量以线偏振光和圆偏振光入射时脂肪乳剂后向散射光的偏振度,研究了532 nm、650 nm和780 nm三个波长的光与散射粒子粒径为325 nm的脂肪乳剂溶液作用后,其后向散射光的偏振度特性.研究表明,对于入射线偏振光,780 nm波长后向散射光中的线偏振光成分多于圆偏振光成分,而532 nm波长则相反;对于入射圆偏振光,三个波长后向散射光中的圆偏振光成分均多于线偏振光成分;532 nm波长的总偏振度高于650 nm和780 nm两个波长各自的总偏振度;线偏振光的保偏性优于圆偏振光的保偏性,但偏振光在散射介质中的穿透深度较小.因此,后向散射成像技术适用于物体表层成像,而且选择波长略大于粒径的线偏振光可以提高成像质量.

关键词: 后向散射 Stokes矢量 偏振度 线偏振光 圆偏振光 散射介质

Characteristics of Degree of Polarization of Backscattering Light in Scattering Medium at Different Wavelengths

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Abstract:

The degree of polarization (DOP) of backscattering light in intralipid were measured based on Stokes vector. The characteristics of DOP were investigated when the interaction between polarized light and scattering midum were taken into account. The polarized light included three different wavelengths of 532 nm, 650 nm and 780nm. The diameter of scattering particle was 325 nm. Experimental results show that the circularly polarized component in backscattering light is more than the linearly polarized component for linearly polarized incident light of wavelength of 532 nm. However, this conclusion is reverse for wavelength of 780 nm. In addition, the circularly polarized component is more than the linearly polarized component for three different wavelengths when circularly polarized incident light was used. Furthermore, the total DOP value of 532 nm was larger than that of 650 nm and 780 nm respectively. Linearly polarized light maintained polarization better than circularly polarized light, however, the penetrating depth through scattering medium of polarized light was short. So the imaging used backscattering light can be applied to image superficial objects. Besides, the imaging quality can be improved if the wavelength of incident light is a little bigger than the diameter of scattering particle.

Keywords: Backscattering Stokes vector Degree of polarization Linearly polarized light Circularly polarized light Scattering medium

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