# 基于Monte Carlo在体生物光学成像的光子传输模型

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Abstract

With the development of molecular marker technique and optical imaging technique, In Vivo bioluminescent imaging attracts more and more attention and is extensively used to non-invasively visualize the physiological and pathological process of biological tissues in real time. The photon propagation model and photon propagation rule are two key components of bioluminescent imaging. In this paper, a photon propagation model of bioluminescent imaging based on Monte Carlo method is proposed. With known quantities (e.g. parameters of bioluminescent source, biological tissue, and CCD detectors) and Monte Carlo technique, two mathematic models including photon generation from bioluminescent sources and photon propagation in biological tissue are realized. Then, several comparative experiments are performed and experimental results are given, which illustrates the correctness and efficiency of this algorithm.

摘要

随着分子标记技术和光学成像技术的发展,在体生物光学成像倍受关注,并广泛应用于对生物组织的生理或病理过程的无损实时动态成像.研究生物组织中的光子传输模型和光子传输规律,是开展在体生物光学成像研究的两个关键环节.提出了一种基于Monte Carlo方法的在体生物光学成像中的光子传输模型.已知荧光光源参数、生物组织参数和探测器参数,建立荧光光源发射光子、光子在生物组织中传输的数学模型,并利用Monte Carlo方法实现这些模型.最后做了对比实验,实验结果表明了该算法的正确性和有效性.

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