Event-based bispectral photometry: Analysis of bispectral differences using temporally modulated illumination
イベント情報を用いた二波長測光法
－時間変調された照明を用いた二波長間光吸収差分の解析－

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Analysis of a bispectral difference plays a critical role in various applications that involve rays propagating in a light absorbing medium. In general, the bispectral difference is obtained by subtracting signals at two individual wavelengths captured by ordinary digital cameras, which tends to inherit the drawbacks of conventional cameras in dynamic range, response speed and quantization precision. In this thesis, we propose a novel method to obtain a bispectral difference image using an event camera with temporally modulated illumination. Our method is rooted in a key observation on the analogy between the bispectral photometry principle of the participating medium and the event generating mechanism in an event camera. By carefully modulating the bispectral illumination, our method allows to read out the bispectral difference directly from triggered events. Experiments using a prototype imaging system have verified the feasibility of this novel usage of event cameras in photometry based vision tasks, such as 3D shape reconstruction in water. In addition to this, this thesis investigates whether the performance of the system can be improved by listing the performance of the event camera or by adjusting the period of the light modulation.

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