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# Research on the Influence of Swing Mirror of Infrared Imaging System with Image-space Scanning

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**Abstract:** To achieve miniaturization and weight reduction, an infrared imaging system with image-space scanning is proposed. The system combines an instantaneous field of view with spatial scanning. Thus, large-field-of-view scans are realized, also featuring small radial size and compact structure, among other characteristics. The system designed in this study is composed of a front objective lens set, relay lens set, tertiary imaging lens set, and swing mirror. The main function of the swing mirror is to achieve large-field-of-view scans. The relationship between the object and image of the scanning system is analyzed using the dynamic optics theory, which verifies the ideal state of the swing mirror in one-dimensional scanning movements. Based on this, we focus herein on the analysis of the relationship between the object and image of the swing mirror during two-dimensional scanning movements, after introducing the angular error. When the swing mirror introduces the angular error, the image rotation and skew can be calculated in detail, providing a theoretical basis for the structural design and control accuracy of the swing mirror in the scanning system.

**Keywords:** Image-space scanning; Swing mirror; Object-image relation; Rotation

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## 1 Introduction

In recent years, scanning as a crucial technique has become increasingly important. Because the combination of scanning techniques and infrared technology can speed up image acquisition and improve efficiency, it has been widely adopted in various fields such as biomedical application and remote sensing [1-4]. Early scanning modes, for instance, axe scanning mirror scanning and separated aperture scanning,

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