Boresight Calibration of Mobile Mapping System

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Key words:

ABSTRACT

Major progress has been made in Mobile Mapping Systems (MMS) over the last few years in terms of sensor resolution, data rate, and operational flexibility. Thus, the use of such sensors in mapping applications has become very attractive. To move from the static use of such sensors to kinematic applications, exterior orientation parameters for the sensor are needed in high dynamics situations. In exchange, fully automated data acquisition at high speed can be obtained and the range of applications can be considerably extended. Two basic solutions to the exterior orientation problem are currently available. In the first one, the parameters are determined directly by using suitable position and orientation sensors. In the second one, they are determined indirectly by extracting them from a block of images with a sufficient number of known control points. In the first case the system is more complex, in the second, the operational restrictions are more severe.

In this paper the emphasis will be on the first approach, the direct determination of sensor position and orientation. In this approach boresight calibration of the MMS is a critical factor for map production, especially in the case of digital imaging sensors. The focus of this paper is therefore on boresight calibration using different approaches.

The paper will cover both, the concept of boresight calibration and implementation aspects. Features common to most systems will be identified and a unified model for boresight calibration for airborne and land mapping application will be formulated. Suitable observables for this model will be assessed, and factors affecting system performance will be discussed. All major features will be illustrated by examples for land and airborne MMS systems.

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