

SPATIAL DISTRIBUTION REQUIREMENTS OF REFERENCE GROUND CONTROL FOR ESTIMATING LIDAR/INS BORESIGHT MISALIGNMENT

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LiDAR (Light Detection and Ranging, also known as Airborne Laser Scanning – ALS) is a powerful technology for obtaining detailed and accurate terrain models as well as precise description of natural and man-made objects from airborne platforms, with excellent vertical accuracy. High performance integrated GPS/INS systems provide the necessary navigation information for the LiDAR data acquisition platform, and therefore, the proper calibration of the entire Mobile Mapping System (MMS) including individual and inter-sensor calibration, is essential to determine the accurate spatial relationship of the involved sensors. In particular, the spatial relationship between the INS body frame and the LiDAR body frame is of high importance as it could be the largest source of systematic errors in airborne MMS. The feasibility of using urban areas, especially buildings, for boresight misalignment is still investigated. In this research, regularly or randomly distributed, photogrammetrically restituted buildings are used as reference surfaces, to investigate the impact of the spatial distribution and the distance between the necessary 'buildingpositions' on boresight's misalignment parameter estimation. The data used for performance evaluation included LiDAR point clouds and aerial images captured in a test area in London, Ohio, USA. The city includes mainly residential houses and a few bigger buildings.