

Geometry Strength of ADS40 Multi-Ray Intersection and its Object Point Positioning Quality

Ruey-An Chen¹, Jaan-Rong Tsay², Yu-Han Chang³

¹*Graduate Student, Department of Geomatics, National Cheng Kung University
1 University Road, Tainan 70101, Taiwan, g3652678@yahoo.com.tw*

²*Associate Prof., Department of Geomatics, National Cheng Kung University
1 University Road, Tainan 70101, Taiwan, tsayjr@mail.ncku.edu.tw*

³*Graduate Student, Department of Geomatics, National Cheng Kung University
1 University Road, Tainan 70101, Taiwan, P66014141@mail.ncku.edu.tw*

This paper will study the geometry strength (condition number) of ADS40 multi-ray intersection and its object point positioning quality (accuracy and reliability). Firstly, theoretical quality figures are determined by using simulated data, in which the angle between forward and backward directions remains the constant 42°, but both angles between forward and nadir directions and between backward and nadir directions are different for all cases with diverse number of corresponding photographic rays from ADS40 images. Their results are compared with each other and analyzed. Also, real ADS40 images are utilized for this study, in which all test results are evaluated by means of ground check points measured by static GPS positioning method and with cm accuracy level. Simulated tests illustrate that, for single strip case, the horizontal and vertical accuracy is 0.25 and 0.55 pixels, respectively. In case of three parallel strips, both accuracies are 0.14 and 0.19 pixels, respectively. They are increased with the rate 44% and 65%. On the other hand, all tests with real ADS40 images show that the object point positioning accuracy is about 0.5 and 0.6 pixels, respectively, on horizontal and vertical direction. All will be expressed and analyzed in more details, and conclusions are drawn in this paper, too.

Keyword: geometry strength, airborne digital sensors ADS40, multi-ray intersection, object point positioning, quality