



[Volume XXXIX-B3](#)

Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XXXIX-B3, 187-192, 2012
www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XXXIX-B3/187/2012/
doi: 10.5194/isprsarchives-XXXIX-B3-187-2012
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RESEARCH ON THE THREE ANGULAR RESOLUTION OF TERRESTRIAL LASER SCANNING

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Keywords: Terrestrial Laser Scanning, Angular Resolution, AMTF Model, EIFOV Model, Beamwidth, Sampling Interval

Abstract. Terrestrial laser scanning technology has been applied more and more widely in the field of Surveying and mapping. Although requirements of the accuracy for different laser scanner survey may differ considerably, spatial resolution is an important aspect, which can be divided into range and angular components. The latter is a focus of this paper and is governed primarily by scanning interval, laser beam width and angle quantisation. An ultimate goal of this research is to derive the relationship and simplified formula between scanning interval and the angular quantisation when the EIFOV(Effective Instantaneous Field of View) is equal to the scanning interval; the relationship and simplified formula of scanning interval and the angular quantisation when the EIFOV is equal to the laser beam width, and the relationship and simplified formula of the theoretical minimum EIFOV and the angular quantisation. Firstly, this paper introduces the EIFOV model and the AMTF(Average Modulation Transfer Function) model. Secondly, the dimensionless AMTF and EIFOV generic model are proposed. Thirdly, the above relationships are deduced, which are ellipse or hyperbola, and the three simplified formulas are proposed. The simplified formulas have direct significance on the angular resolution's calculation and the scanning interval setting.

[Conference Paper](#) (PDF, 439 KB)

Citation: Yang, R., Hua, X., Liu, J., and Wu, H.: RESEARCH ON THE THREE ANGULAR RESOLUTION OF TERRESTRIAL LASER SCANNING, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XXXIX-B3, 187-192, doi:10.5194/isprsarchives-XXXIX-B3-187-2012, 2012.

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