Title:	OPTIMUM METHODS FOR QUASI-ORTHOGRAPHIC SURFACE IMAGING
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Keyword(s):	Orthography, Surface Imaging Optimization, Approximation Digital Terrain Modelling, Field Of View
Subject(s):	Remote Sensing, Surface Imaging Computational Photography, Orthographic Imaging

Abstract: Surveillance and surveying are two of the most important aspects of almost any empirical research, be it Information Technology, Geology or even Sociology. With the growth of such disciplines, the need for fast, effective and accurate surveys have become increasingly necessary. A major part of the research is supported by photographic surveys which are used for capturing expansive natural surfaces using a wide range of sensors- visual, infrared, ultrasonic, radio, etc. Because of the unpredictability and fast-varying characteristic of natural surfaces, it is often very difficult to capture and reconstruct them accurately. Moreover, the non-smooth nature results in the occlusion of major areas when a small number of captures are used for reconstruction, resulting in loss of important and maybe significant information or surface features. In a perfect orthographic reconstruction, images must be captured normal to each point on the surface which is practically implausible. This thesis aims at proposing several algorithms for deciding optimal capture points, given a surface, such that the optimal captures can be used for an approximate orthographic reconstruction. An approximate orthographic capture has been attributed to a small field of view and a closed form relationship has been derived for evaluating local orthographic capture region which varies depending on the point of capture on the surface. Based on the formula to calculate approximate local orthographic regions, several algorithms have been developed using non-convex optimization techniques for covering the entire surface with minimum number of such capture points. The algorithms have been compared on the basis of accuracy and computational complexity and parameters have been tuned depending on the nature of the surface. A separate algorithm has been proposed to identify such capture points empirically depending on the local surface-curvatures. Given these algorithms, a user can make informed choices regarding which to adopt in their application as per their requirements.

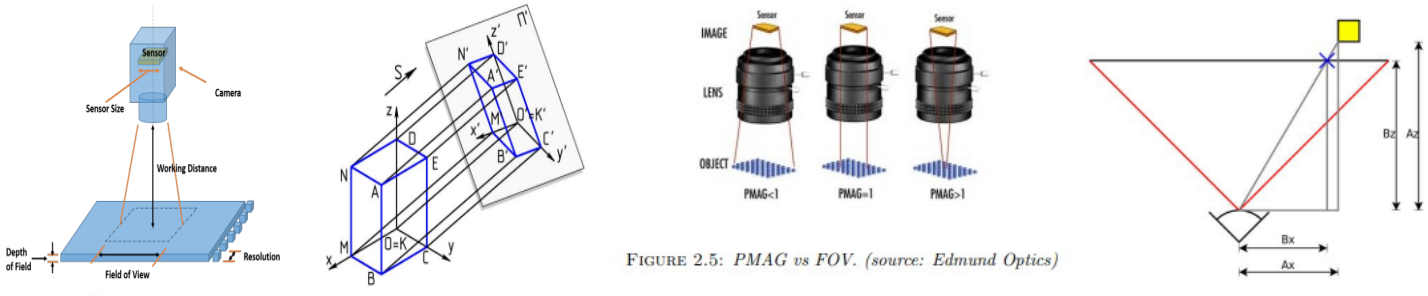

FIGURE 2.5: *PMAG vs FOV. (source: Edmund Optics)*

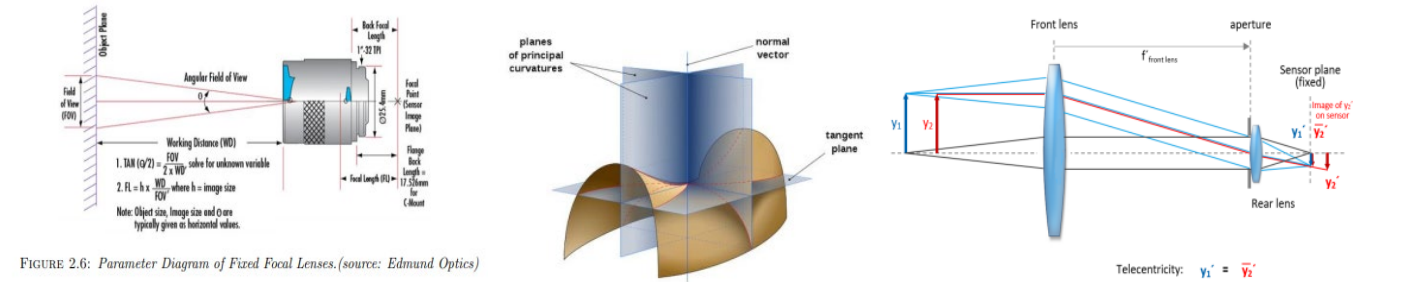

FIGURE 2.6: *Parameter Diagram of Fixed Focal Lenses.(source: Edmund Optics)*