

On the Location of the Centers of Projection of an Objective and Its Significance in Photogrammetry

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SUMMARY: The centers of projection of the optical projection by an objective do not lie at the nodal points, but in the pupils. Nodal points and pupils coincide only in special cases, e.g., in rigorously symmetrical objectives. In strongly unsymmetrical objectives, e.g. tele-objectives, the pupils can have quite considerable distances from the nodal points. The actual ray path therefore deviates from the central projection by the nodal points, often drawn diagrammatically, and this is to be borne in mind, e.g., when using the conceptions distortion, image distance, inner orientation. The location of the projection centers in the reproduction of the object space on an image plane has a measurable effect: in the object space on the object distance. and, with it, the perspective, in the image space on the location of the centers of the circles of confusion in the case of out of focus setting. In principle, the first influence does not play a role in most cases for photogrammetry, the second one in plotting instruments in the case of intentional or unintentional out of focus setting. In practice, the distance between the nodal points and the pupils is to be neglected in the Multiplex. When adjusting the Stereoplanigraph, the exit pupil as the center of projection is brought to the cardan point, as it corresponds to the fundamental requirement.

MARTHA W. CARTA

EDITOR'S NOTE: Mrs. Carta submitted an excellent translation of the paper by Dr. Roos, written in German. This paper was carefully considered by a reviewer selected by the Publications Committee because of his competence. His recommendation, accepted by the Committee, was that the paper be not approved for publication in PHOTOGRAMMETRIC ENGINEERING. This action was not based upon any lack of merit because the high standard of Dr. Roos' writings and Mrs. Carta's translation are thoroughly recognized. Briefly the reason for failure to approve publication is that the paper was initially published in German about 17 years ago. The contents of the paper can be assumed to be reasonably accurate inasmuch as the original is repeatedly used as a reference

in the literature on this subject. For example, it is referred to in a paper by Roelofs on "Distortion, Principal Point, Point of Symmetry and Calibrated Principal Point" which appears in *Photogrammetria*, II, 49 (1950-1951). The paper is chiefly of interest to designers of optical systems and it is safe to assume that the majority of this group is already familiar with the principles set forth in this paper.

At my suggestion Mrs. Carta submitted the "summary" above given in order that those interested in the subject covered by the paper and unfamiliar with earlier publications may know of the translation into English. The summary is a part of the original paper. The author gave permission to Mrs. Carta to publish the translation of the paper.