

系所組別：測量及空間資訊學系

考試科目：科技英文

考試日期：0222，節次：1

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、英翻中。把握文意重點，不須逐字翻譯，專有名詞、人名與地名無常用的中文翻譯時可使用原文。

1. (15 分)

The purpose of a reference frame is to provide the means to materialize a reference system so that it can be used for the quantitative description of positions and motions on the earth (terrestrial frames), or of celestial bodies, including the earth, in space (celestial frames). In both cases the definition is based on a general statement giving the rationale for an ideal case, i.e. for an ideal reference system. For example, one would have the concept of an ideal terrestrial system, through the statement that with respect to such a system the crust should have only deformations (i.e., no rotations or translations). The ideal concept for a celestial system is that of an inertial system so defined that in it the differential equations of motion may be written without including any rotational term. In both cases the term "ideal" indicates the conceptual definition only and that no means are proposed to actually construct the system.

2. (15 分)

There seems to be general agreement that only two basic coordinate systems are needed: a Conventional Inertial System (CIS), which in some "prescribed way" is attached to extragalactic celestial radio sources, to serve as a reference for the motion of a Conventional Terrestrial System (CTS), which moves and rotates in some average sense with the earth and is also attached in some "prescribed way" to a number of dedicated observatories operating on the earth's surface. In the latter, the geometry and dynamic behavior of the earth would be described in the relative sense, while in the former the movements of our planetary system (including the earth) and our galaxy could be monitored in the absolute sense. There also seems to be a need for certain interim systems to facilitate theoretical calculations in geodesy, astronomy, and geophysics as well as to aid the possible traditional decomposition of the transformations between the frames of the two basic systems.

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3. (15 分)

The process of mobile mapping is basically executed by producing more than one image that includes the same object from different positions, and then the 3D positions of the same object with respect to the camera frame can be measured. Since the early nineties, advances in satellite and inertial technology made it possible to think about mobile mapping in a new way. Instead of using ground control points as references for orienting the images in space, the trajectory and orientation of the imager platform can now be determined directly. Cameras, along with positioning and orientation sensors, are integrated and mounted on a land vehicle for mapping purposes. Objects of interest can be directly measured and mapped from images that have been georeferenced using positioning and orientation sensors. An example of land based mobile mapping system is illustrated in Figure 1. Figure 1a gives an overall view of the sensors onboard of the land based mobile mapping system from different perspectives, and Figure 1b depicts an overall view of the mobile mapping van. In addition, Figure 1c illustrates an example of direct geo-referencing the corner of interest shown in green dot from two geo-referenced images. This procedure is accomplished through the use of precise positioning and orientation techniques.

4. (15 分)

Photogrammetry uses methods from many disciplines, including optics and projective geometry. The data model on the right shows what type of information can go into and come out of photogrammetric methods. The 3D co-ordinates define the locations of object points in the 3D space. The image co-ordinates define the locations of the object points' images on the film or an electronic imaging device. The exterior orientation of a camera defines its location in space and its view direction. The inner orientation defines the geometric parameters of the imaging process. This is primarily the focal length of the lens, but can also include the description of lens distortions. Further additional observations play an important role: With scale bars, basically a known distance of two points in space, or known fix points, the connection to the basic measuring units is created. Each of the four main variables can be an input or an output of a photogrammetric method. Photogrammetry has been defined by the American Society for Photogrammetry and Remote Sensing (ASPRS) as the art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena.

二、短文寫作 (40 分)。

Write an essay about 300-500 words to express your research interests based on three disciplines categorized in the Department of Geomatics, including Global Navigation Satellite System, Remote Sensing and Geographic Information System, respectively. Use the knowledge and experience you have gained through undergraduate courses and illustrate how they would inspire you to conduct your future study.