國立交通大學 104 學年度第 2 學期
博士班資格考筆試考試試題

土木工程學系 測量組(戊) 科目：專業科目(攝影測量及遙測學) 選考學生數：1 考試時間：120min

Closed book exam.

1. Please explain what is albedo. And, please order these five surface covers – Forest, Desert sand, fresh snow, grasslands, and asphalt - from **highest** albedo to **lowest** albedo in near infrared spectrum (i.e., 800 – 900 nm) (20%).

2. Please explain what is aerosol, and how aerosol could be observed from satellite with remote sensing tools. Please describe the limitation of MODIS approach, and the other improvements such as MISR (30%).

3. Please answer the following questions in image matching (25%):
   a. Please describe the details of Normalized Cross Correlation (NCC) and Least Squares Matching (LSM).
   b. What are the differences between NCC and LSM?
   c. How to do the geometrical constrain in image matching for traditional stereo aerial images?

4. Please answer the following questions in image fusion (also called color fusion or pan sharpening) for satellite image (25%):
   a. The spatial resolution of a panchromatic image is usually better than its multispectral counterpart in the same satellite. Why?
   b. Please provide an algorithm to do the image fusion for Formosat-2 panchromatic and multispectral satellite images? What are the advantages and disadvantages for this algorithm?
   c. How to evaluate the quality of fused image?

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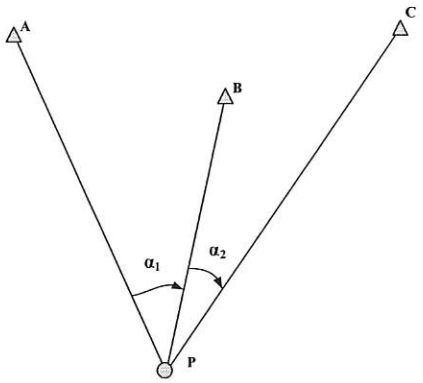
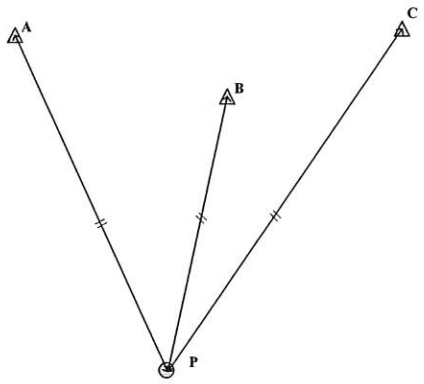
土木工程學系 測量組(戊)　科目：基礎科目(測量學、測量平差)　選考學生數：1　考試時間: 120min

Closed book exam.

1. In a problem of three-point resection, angles ($\alpha 1$, $\alpha 2$) were measured by a theodolite. The coordinates of stations A, B and C were (X_A, Y_A), (X_B, Y_B) and (X_C, Y_C). Please provide detail equations to determine the coordinates of P. (15%)



2. In a problem of three-point distance intersection, distances AP, BP, CP were measured by a tape. The coordinates of stations A, B and C were (X_A, Y_A), (X_B, Y_B) and (X_C, Y_C). Please use **least squares adjustment** to determine the coordinates of P. (15%)



3. Compare the following methods for outlier detection:
   (a) Tau-test (10%)
   (b) Baada's data snooping (5%)
   (c) Danish method of weight change (5%)
4. Compare the following methods for interpolations
(a) Least-squares collocation (5%)
(b) Kriging (10%)
5. Please describe what is "traverse", list ALL types of traverse and describing their geometric and mathematic nature, observations, number of "degree of freedom", and the way of "traverse computation" for that type (15%).

6. Please describe the principle of EDM (Electronic Distance Measurement) and all the error sources (20%).