



NOTICE OF THESIS DEFENCE PRESENTATION

Geodesy and Geomatics Engineering
Doctor of Philosophy

Shaheen Ghayourmanesh

Friday, May 21, 2004
Head Hall Room E-11 @ 1:00 pm

Examining Board:

Supervisor: Dr. Yun Zhang (Geodesy and Geomatics Engineering)

Supervisory Committee: Dr. David Coleman (Geodesy and Geomatics Engineering)
Dr. YC Lee (Geodesy and Geomatics Engineering)

Chair: Dr. Sue Nichols (Director of Graduate Studies, GGE)

**DEM Extraction in Polarimetric Synthetic Aperture Radar Images Using Shape From
Shading and Shift in Polarization Signature Plot**

ABSTRACT

This research intends to establish a new application for a single Synthetic Aperture Radar (SAR) Polarimetry image. This new technique extracts height information from fully polarimetric data by using and merging two techniques – shape-from-shading (SFS) and shift in polarization signature plot. Radar shape from shading is a technique, which could be used for elevation information extraction from a single SAR image. This technique applies a constraint to solve the ambiguity of the surface normal. In addition, as it is mentioned by researchers, the information contents of the SAR image pixels, which are used in radar SFS equation, are carrying more information about range direction, not the azimuth direction, which means radar SFS is able to extract the slope profiles in range direction. On the other side, in a single Quadrature Polarization (Quadpol) SAR image, as there are four layers of polarization information, the maxima shift in polarization signature plot technique could be used to recover the slope information in azimuth direction. Both methods need a known height in each profile to extract the height of that profile. There are also some other problems in both methods. By looking more precisely at the problems for both methods, it could be inferred that the two techniques could be integrated for elevation reconstruction on a single POLSAR image in such a way that each one removes most of the limitations and the problems of the other one. In the proposed technique the absolute height could be recovered by having one known height point in the study area.

All Faculty Members and Graduate Students are invited to attend the presentation.