Notice of University Oral Examination

Geodesy and Geomatics Engineering

Doctor of Philosophy

Jason Bond

Wednesday, October 3, 2007
Head Hall – ADI Room @ 11:00 am

Co-Supervisors: Dr. Anna Szostak-Chrzanowski, GGE
                       Dr. Adam Chrzanowski, GGE
                       Dr. Don Kim, GGE

Examining Board: Dr. James Secord, GGE
                       Dr. Richard Langley, GGE
                       Dr. Arun Valsangkar, Civil Eng.
External Examiner: Dr. Xiaoli Ding, Hong Kong Polytechnic University
Chair: Dr. Gwendolyn Davies, School of Graduate Studies

Bringing GPS Into Harsh Environments For Deformation Monitoring

ABSTRACT

Certain deformation monitoring environments pose severe limitations on the achievable accuracy and precision that can be attained by instrumentation used to monitor deformation behaviour. Large open pit mines are one example. In such environments, it is not uncommon for the degradation in precision of geodetic technologies to be so large that the minimum detectable displacement exceeds the mine's requirements for displacement detection. In order to meet these requirements, an innovative approach to deformation monitoring is required.   Presented is a technique which capitalizes on the advantages of Global Positioning System (GPS) sensors to provide fully-automated and continuous sub-centimetre displacement detection in real-time. Software was developed which utilizes triple-differenced carrier phase observations in a Delayed-State Kalman filter to provide continuous, high precision position updates in a fully-automated mode. The software was enhanced to include pseudolite processing capabilities. An interdisciplinary approach was then used to predict deformation behaviour to aid in the design of a geodetic deformation monitoring scheme.

It was shown that the processing strategy employed helps to mitigate the effects of residual tropospheric delay biases. Additionally, it was illustrated that pseudolites can be used to provide more continuous position updates in harsh environment conditions. An example was also given to demonstrate how deterministic modeling can be used to predict deformation behaviour and how this information can be incorporated into the design a geodetic deformation monitoring scheme.

Faculty Members and Graduate Students are invited to attend this presentation