NOTICE OF
UNIVERSITY ORAL

GEODESY AND GEOMATICS ENGINEERING

Master of Science in Engineering

Carlos Rubrio Videira Marques

Thursday, August 9, 2012 @ 10:00 am

Head Hall – Room E-11

BOARD OF EXAMINERS:

Supervisor: Dr. John Hughes Clarke, Geodesy and Geomatics Eng.

Examining Board: Dr. Yun Zhang, Geodesy and Geomatics Eng.
Dr. Jonathan Beaudoin, Hydrographic Center, UNH

Chair: Dr. Sue Nichols, GGE

AUTOMATIC MID-WATER TARGET DETECTION USING MULTIBEAM WATER COLUMN

ABSTRACT

A potential new automatic application in multibeam water column is the recognition and precise location of suspended mid-water targets. This is already being applied manually in the ArcticNet program for searching for lost under-ice mooring hardware.

The pattern of the scattering field around a suspended point mid-water target is directly related to the multibeam imaging geometry, including pulse length, transmission and reception main lobe beam-widths as well as side lobe spacing and suppression. Knowing this geometry-specific scattering pattern, optimal 3D matched filters can be designed to pick out faint targets from noise. Having picked an object in this manner, its location can be derived with the same positioning uncertainty that we already associate with depth.

Equivalent detection of objects can be achieved manually by the trained operator when carefully inspecting all the data, but is a very long and tedious task. An automatic algorithm developed as the main component of this thesis can be used to perform this task more rapidly and reliably, as well as tracking the object's movement. These new capabilities can be used in oceanographic research, in search and rescue, also for military purposes, and to track geological activity. A specific case study used as an example is the monitoring of suspended targets over seabed markers that are progressively displaced by landslides.

Faculty Members and Graduate Students are invited to attend this presentation.