ERCIM "Alain Bensoussan"
Fellowship Scientific Report

Fellow: Thanh-Duong Nguyen
Visited Location :   Norwegian University of Science and Technology, Norway
Duration of Visit: 12 months (October 04th, 2010 - October 3rd, 2011)

I - Scientific activity

My research at NTNU concerned with nonlinear inversion methods and its application to matched-field inversion for geoacoustic parameters and seabed shear wave speed profiles.

I have implemented and run benchmarks with many nonlinear inversion methods: Simulated annealing (SA), adaptive simplex simulated annealing (ASSA), differential evolution (DE), adaptive simplex differential evolution (ASDE). I have introduced a modified ASSA method that improved the probability to reach the global minima in multi-dimensional search space.

The mentioned nonlinear inversion methods have been integrated with some forward models for matched-field inversion, such as ORCA (range independent normal mode method for acoustic wave propagation), Lybin (ray tracing method).

For the inverse problem to estimate seabed shear wave speed profiles, I have implemented integrated interfaces for surface wave propagation forward model (Scholte and Love wave). I have introduced a new dynamic power-law model for seabed shear wave speed profiles characterization, which has a flexibility for inversion model parameterization.

I have attended all the group meeting and seminars in Acoustic group of NTNU.

II- Publication(s) during your fellowship

None

III -Attended Seminars, Workshops, and Conferences

The 34th Scandinavian Symposium on Physical Acoustics, Geilo, Norway
30 January - 2 February 2011.

Thanh-Duong Nguyen and Hefeng Dong: *Matched-field inversion for geoacoustic parameters using ASSA*

IV – Research Exchange Programme (12 month scheme)

1. Host institute: FORTH-ICS, Greece
    Contact name: Prof. Dimitris Nikolopoulos
    Date: June 1st to June 8th, 2011

    Activities:
    - Introduce my research theme at NTNU
    - Participate in a weekly group meeting
    - Discuss on parallelization methods using MPI and SMPSS

2. Host institute: University of Geneva - SARIT, Switzerland
    Contact name: Prof. Bastien Chopard (Scientific and Parallel Computing Group, CUI)
    Date: September 19th to September 26th, 2011

    Activities:
    - Introduce my research theme at NTNU
    - Discuss on traffic simulation models
    - Implement a simple traffic simulator
    - Discuss on Lattice Boltzmann method for scientific simulation.
    - Discuss on parallelization methods for scientific simulation using GPU and MPI