2° présentation

**TITRE** : Direct and inverse modelisation in EMG

**PAR** : M. Pooya MAGHOUL
          Étudiant au doctorat, École Polytechnique

**DATE** : Lundi 29 novembre 2010

**ENDROIT** : Pavillon Paul-G-Desmarais, local 1120, Université de Montréal

**RÉSUMÉ** : For locating sources of activity within the upper arm and giving the interpretation of the electromyographic (EMG) signals propagating in the upper arm, we are working on the development of a direct and inverse model. The Maxwell and Laplace’s equations, the Finite-Difference Time-Domain Method approach will be investigated.

For the direct method, we applied the Laplace's equation and Finite-Difference Time-Domain Method (FDTM). In solving partial differential equations, the primary challenge is to create an equation that approximates the equation to be studied, but is numerically stable. This was evaluated by applying those two methods to experimental data. Signals were obtained with a tank surrounded by 16 equally spaced electrodes, filled with a saline solution within which up to three dipoles had been placed and moved around.

For the inverse problem, we are planning to use analytic formula derived from direct problem couple with the gradient method to minimize errors. Having obtained satisfactory direct and inverse models, new experiments with the tank will be done with obstacle simulating the presence of bones, blood vessels, nerves, skin and fat layers. The inverse model will then be applied to EMG signals collected from normal and amputee persons.

The final aim of this project is to examine the feasibility of locating independent myoelectric control signals from upper limb amputees. With such signals, they could learn to easily operate in their daily life, a myoelectric prosthesis capable of producing different useful movements.

**Directeur de recherche**: Pierre A. Mathieu, professeur titulaire, département de physiologie/Institut de génie biomédical/Université de Montréal. **Co-directeur**: Michael J. Corinthios, professeur titulaire, département de génie électrique, École Polytechnique