Meeting: 1007, Santa Barbara, California, SS 1A, Special Session on Dynamical Systems in Neuroscience

1007-37-29 **Willy Govaerts** and **Bart Sautois*** (bart.sautois@ugent.be), Krijgslaan 281 - S9, 9000 Gent, Belgium. *Numerical computation of phase response curves in Matlab.* Preliminary report.

CL_MATCONT and its GUI version MATCONT are Matlab toolboxes for the study of dynamical systems and continuation of equilibria, limit cycles and their bifurcations. The current versions are available at:
http://allserv.UGent.be/~ajdhooge.

Limit cycles are important in neural modeling, in particular in the case where each cycle contains an action potential. The Phase Response Curve (PRC) of a limit cycle is a real-valued function defined on the same time interval as the limit cycle. Its value in each point is the relative shortening of the period when an input pulse is given in the corresponding point of the cycle.

PRCs of neural models are important for the network and synchronization properties of the models since giving a pulse corresponds to receiving a stimulus from a nearby neuron. Their computation is usually done by (time-consuming) simulation experiments or by the 'adjoint method', as in XPPAUT.

In the present talk we shortly discuss the continuation of limit cycles with a free parameter in CL_MATCONT. We show how the PRCs can be obtained cheaply as a byproduct of the continuation. We focus on the mathematical background of our algorithm for PRCs and the technical-numerical issues that arise in the implementation. (Received December 14, 2004)