

Sensitivity Analysis Applied To the Saccadic Movements Model and Comparison with Ataxic Patients' Registry

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Extended Abstract

Spinocerebellar ataxias are a group of diseases characterized by cerebellar syndrome associated with progressive slowing of saccadic eye movements, peripheral neuropathy, sleep disorders, and manifestations of parkinsonism. ¹ Assessment of saccadic eye movement could provide objective values to help to understand the symptoms of neurodegenerative disorders. ² A.T. Bahill studied such movements in healthy persons and proposed a model of six differential equations to describe these. ³ In this paper, and considering that model, the saccadic movements are simulated considering as inputs data of healthy persons and sick patients with the mentioned disease. The principal objective consists of contrasting the behavior of saccadic magnitudes according to the model with the observed behavior according to experimental data extracted from the electrooculographic records and, consequently, performing a sensitivity analysis of the obtained solution. ⁴⁻⁵ The search required the SIMULINK application incorporated into the mathematical assistant MATLAB. This tool allows observing the simulations resulting from the model by varying the parameter from 20% to 200%. From the research is concluded that the inputs of pulse-step shape allow getting similar results to those obtained by Bahill. ⁶ However, there is no correspondence between these and others of experimental character, excluding the forms of inputs above referred. The system shows sensitivity in front of parameters like pulse width and pulse height.

References

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