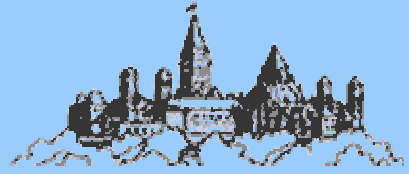# Modelling and Identification of Tissue Impedance

January 12, 2006
admission is free
5:30 – 7:00 pm
Mackenzie Building 4359
Carleton University

Evoked potentials (EPs) are signals generated by the nervous system in response to external stimuli. The measurement of such signals can be used to test the integrity and functioning of the nervous system and to diagnose various neuromuscular disorders. Examples of commonly used EPs are: visual evoked potentials (VEPs), brainstem auditory evoked potentials (BAEPs), and somatosensory evoked potentials (SEPs).

A lumped electrical circuit model is developed for the neuro muscular system between he input electrode and the output electrode response of the artifact generation process. A novel tissue modeling approach is proposed that uses an autoregressive moving average (ARMA) parametric technique and an artificial neural network (ANN) to estimate tissue parameters from experimental data. This coupled with an estimation of the stimulation electrode/skin impedance completes the lumped circuit model.

These results show that both the stimulation electrode-skin interface impedance and nature of the body tissue directly under the recording electrodes have a profound effect on the appearance of the stimulus artifact tail. This was verified by experimentally recorded data obtained from the median nerve using surface electrodes.

Conclusions drawn from this work include that stimulation electrodes with low series capacitance should be used whenever possible to minimize the duration of the artifact tail.

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R.Doraiswami (M'76-SM '85) obtained his B.E. from Victoria Jubilee Technical Institute, Bombay, India, M.E. from the Indian Institute of Science, Bangalore, India and Ph.D from Johns Hopkins University, Baltimore, USA all in Electrical Engineering, in 1962, 1965 and 1971 respectively.

He was a professor of Electrical Engineering at the Federal University of Santa Catarina, Florianopolis, Santa Catarina, Brazil from 1971to 1981, and at the Federal University of Rio de Janeiro, Rio de Janeiro, Brazil from 1976-1978. Since 1981 he has been with the University of New Brunswick, Fredericton, New Brunswick, Canada where he is now a professor of electrical and computer engineering. He has held visiting positions at various universities in Netherlands, Germany, Singapore and China. He was consultant to industries including Siemens, Lockheed Martin, Biopeak, Lizzottem consultants, and GKN helicopter. He was a United Nations expert in India.

His are of research include control system, power system, signal processing, detection and estimation, navigation, and pattern recognition, biomedical application. He is a senior member of the IEEE, fellow of the Indian Institute of Engineers and a professional Engineer in the province of New Brunswick, Canada.