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A new bifurcation parameter in a modified Huber-Braun model

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Thermally sensitive neurons represent a bursting-spiking activity which is characterized by fast repetitive spiking trains of action potentials followed by quiescent periods. Synchronization of this activity in a network of coupled spiking neurons such as the epileptogenic zone in the brain may cause some neurological disorders such as epileptic seizures. The aim of this paper is to introduce a new algorithm for prediction the spiking onset in a model of an epileptic neuron and we try to use some parameters for feature extraction in our simulations which are potentially applicable in the non-invasive brain stimulation techniques such as repetitive Trans-Cranial Magnetic Stimulation (rTMS). In this regard, a modified Huber-Braun model of a thermally sensitive neuron exposed to external rTMS-induced voltages is presented. Applying the Chaos theory, the bifurcation diagram of a modified Huber-Braun model with a novel bifurcation parameter has been represented. Then we used the time at which the period doubling bifurcation is started in order to approximate the seizure onset in the modified model.

Biography

Mahnaz Asgharpour received the BS in Biomedical Engineering from Jondishapoor University of Medical Sciences, Ahwaz, Iran and the MS degree in Biomedical Engineering from the Department of Biomedical Engineering of the Science and Research branch of Azad University, Tehran, Iran. She is a PhD candidate in electrical engineering, control and system design at the department of electrical engineering, Tehran Science and Research branch of Azad University. She has been a Lecturer at the Technical and Engineering Department of Azad University for up to four years. Her research interests include computational neuroscience, nonlinear dynamics and chaos.

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