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가을학술논문발표회 및 임시총회

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초록내용

발표번호	P4-F010
분과	통계물리학분과 (Statistical Physics Division)
저자	LIM Woochang (발표자 일반), KIM Sang-Yoon[1] *Daegu National Univerisity of Educaiton, Department of Science Education.* [1]*Kangwon National Univeristy, Department of Physics.*
제목	Stochastic Bursting Synchronization in a Population of Subthreshold Izhikevich Neurons
초록본문	We consider a population of subthreshold Izhikevich neurons that cannot fire spontaneously without noise. As the coupling strength passes a threshold, individual neurons exhibit noise-induced burstings (i.e., discrete groups or bursts of noise-induced spikes). We investigate stochastic bursting synchronization by varying the noise intensity. Through competition between the constructive and the destructive roles of noise, collective coherence between noise-induced burstings is found to occur over a large range of intermediate noise intensities. This kind of stochastic bursting synchronization is well characterized by using the techniques of statistical mechanics and nonlinear dynamics, such as the order parameter, the raster plot of neural spikes, the time series of the ensemble-averaged global potential, and the phase portraits of limit cycles. In contrast to spiking neurons showing only spike synchronization (characterizing a temporal relationship between spikes), bursting neurons are found to exhibit both spike synchronization and burst synchronization (characterizing a temporal relationship between the onset times of the active phases of repetitive spikings). The degree of stochastic bursting synchronization is also measured in terms of a synchronization measure that reflects the resemblance of the global potential to the individual potential.