

STOCHASTIC NEURODYNAMICS

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Abstract. Stochastic dynamics of relative membrane potential in the neural network is investigated. It is called stochastic neurodynamics. The least action principle for stochastic neurodynamics is assumed, and used to derive the fundamental equation. It is called a neural wave equation. A solution of the neural wave equation is called a neural wave function and describes stochastic neurodynamics completely. Linear superposition of neural wave functions provides us with a mathematical model of associative memory process. As a simple application of stochastic neurodynamics, a mathematical representation of static neurodynamics in terms of equilibrium statistical mechanics of spin system is derived.

Key words and phrases: Neurodynamics, neural holography, neural wave equation, neural network, associative memory.