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CONTROL OF NUCLEAR RESEARCH REACTORS BASED ON A GENERALIZED HOPFIELD NEURAL NETWORK

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ABSTRACT—The purpose of this paper is to present a solution to the minimization problem of the transient time to accomplish the switching between different levels of power in a nuclear research reactor satisfying the inverse period constraint and avoiding to use any physical model of the plant. The strategy here proposed consists of two stages: first, the optimal trajectory which satisfies the constraint is calculated off-line; second, a control law based on a generalized Hopfield neural network is employed to assure that the reactor power follows this optimal trajectory. The boundedness for both the weights and the identification error is guaranteed by a new online learning law. Likewise, proposed control law guarantees an upper bound for the tracking error. The effectiveness of this procedure is illustrated by numeric simulation.