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Ming Jiang* (mjiang2@ncsu.edu), 2108 SAS Hall, Department of Mathematics, Campus Box 8205, Raleigh, NC 27606, and **Xiao-Biao Lin**. *Travelling wave solutions, periodic and chaotic solutions in coupled Chua's Circuits.*

In this paper, we studied a singularly perturbed system of partial differential equations, which models an one-dimensional array of coupled Chua's circuits. The PDE system is a natural generalization of the FitzHugh-Nagumo's equation and exhibits more complicated behaviors. We also showed that the system can have a variety of traveling wave and periodic solutions. First asymptotic method was used in the singularly perturbed system to construct solutions in singular and regular layers. Then dynamical systems method was used to obtain the exact solutions near the approximations obtained by the formal method. Moreover, we obtained chaotic solution for this system based on a pair of heteroclinic solution by analytic method of Lyapunov-Schmidt reduction. We showed that there are infinitely many chaotic solutions, each solution uniquely corresponds to a sequence of symbols. (Received October 31, 2012)