

[Yang, Tao](#); [Chua, Leon O.](#)

**Impulsive control and synchronization of nonlinear dynamical systems and application to secure communication.** (English) [Zbl 0925.93374](#)

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Summary: Impulsive control is a newly developed control theory which is based on the theory of impulsive differential equations. In this paper, we stabilize nonlinear dynamical systems using impulsive control. Based on the theory of impulsive differential equations, we present several theorems on the stability of impulsive control systems. An estimation of the upper bound of the impulse interval is given for the purpose of asymptotically controlling the nonlinear dynamical system to the origin by using impulsive control laws. In this paper, impulsive synchronization of two nonlinear dynamical systems is reformulated as impulsive control of the synchronization error system. We then present a theorem on the asymptotic synchronization of two nonlinear systems by using synchronization impulsives. The robustness of impulsive synchronization to additive channel noise and parameter mismatch is also studied. We conclude that impulsive synchronization is more robust than continuous synchronization. Combining both conventional cryptographic method and impulsive synchronization of chaotic systems, we propose a new chaotic communication scheme. Computer simulation result based on Chua's oscillators are given.

**MSC:**

- [93C10](#) Nonlinear systems in control theory
- [37N99](#) Applications of dynamical systems
- [94A05](#) Communication theory
- [34A37](#) Ordinary differential equations with impulses

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