

整數階與分數階奈米參數共振器系統的渾沌及其同步與控制

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摘要

本篇論文探討了整數階與分數階奈米參數共振器系統的渾沌及其同步與控制。用來分析奈米參數共振器系統的分數階積分器的近似表示式可藉由以波德圖分析頻域而得到。藉著相圖、龐卡萊映射圖及分歧圖等數值方法，可以觀察到系統的週期與渾沌的動態行爲。兩個沒有耦合的分數階奈米參數共振器系統之渾沌同步可以藉由第三渾沌系統的渾沌狀態變數之相同函數取代它們相對應的參數而達成。系統的渾沌反控制可以透過增加一個外來的常數項或非線性項而得到。最後藉 van der Pol 系統的渾沌變數的函數取代奈米參數共振器系統的原始參數，可以得到渾沌反控制。

Chaos, Its Synchronization and Anticontrol of Integral and Fractional Order Nano Parameter Resonator Systems

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ABSTRACT

The chaos, chaos synchronization and anti-control of integral and fractional order nano parameter resonator system are studied in this thesis. Linear approximation of a fractional order integrator to analyze nano parameter resonator system can be obtained by utilizing frequency domain techniques based in Bode diagrams. By applying numerical analyses such as phase portraits, Poincaré maps and bifurcation diagrams, the periodic and chaotic motions are observed. The chaos synchronizations of two uncoupled integral and fractional order identical chaotic nano resonator systems are obtained by replacing their corresponding parameters by the same function of chaotic state variables of a third identical chaotic system. Anti-control of chaos are obtained by addition of an external constant term or nonlinear term. Replacing a system parameter by a function of chaotic state variables of a modified van der Pol system, we can obtain anti-control of chaos.