

Self-Switching Phenomena of Synchronization in Coupled Parametrically Excited van der Pol Oscillators

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SUMMARY

Synchronization is one of the fundamental phenomena in nature and it is observed over the various field. Studies on synchronization phenomena of coupled oscillators are extensively carried out in various fields, physics [1], biology [2], engineering and so on. We consider that it is important to investigate the synchronization phenomena of coupled oscillators for the future engineering application. Parametric excitation circuit is one of resonant circuits, and it is important to investigate various nonlinear phenomena of the parametric excitation circuits for future engineering applications. In a simple oscillator including parametric excitation, Ref. [3] reports that the almost periodic oscillation occurs if nonlinear inductor has saturation characteristic. Additionally the occurrence of chaos is referred to in Ref. [4] and [5].

In this study, we investigate self-switching phenomena of synchronization in parametrically excited van der Pol oscillators. By carrying out computer calculations, we confirm that various kinds of synchronization phenomena of chaos are observed. In the case of three subcircuits, in-phase synchronization of three subcircuits, in-phase synchronization of two subcircuits and self-switching phenomenon of synchronization states are observed. Additionally, we confirm that the switching characteristics change by the coupling parameter.

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