Phase synchronized quasiperiodicity in power electronic inverter systems

The development of switch-mode operated power electronic converter systems has provided a broad range of new effective approaches to the conversion of electric power. In this paper we describe the transitions from regular periodic operation to quasiperiodicity and high-periodic resonance behavior that can be observed in a pulse-width modulated DC/AC converter operating with high feedback gain. We demonstrate the occurrence of two different types of torus birth bifurcations and present a series of phase portraits illustrating the appearance of phase-synchronized quasiperiodicity. Our numerical findings are verified through comparison with an experimental inverter system. The results shed light on the transitions to quasiperiodicity and to various forms of three-frequency dynamics in non-smooth systems.

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