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DIPARTIMENTO DI INGEGNERIA

HYBRID CONTROL OF SELF-OSCILLATING RESONANT CONVERTERS

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Relatore

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Abstract

We propose hybrid feedback laws inducing self-oscillating behavior in second-order resonant converters. First we propose a unifying hybrid coordinate representation covering the series and parallel configurations. Then we propose two phase-plane-based control laws. The first controller provides both amplitude and frequency modulation, while the second controller switches at the resonant frequency of its tank. Both controllers operate without the need of external oscillators. In addition, the output amplitude can be adjusted by a reference signal ranging from zero to a certain maximum angle. Theoretical results show uniqueness and almost global asymptotic stability of a non trivial hybrid limit cycle. Experimental results show that a circuit implementing the new controller successfully matches the desirable simulated behavior.