

Batteryless DCM Boost Converter for Kinetic Energy Harvesting Applications

Authors : Andrés Gomez-Casseres, Rubén Contreras

Abstract : In this paper, a bidirectional boost converter operated in Discontinuous Conduction Mode (DCM) is presented as a suitable power conditioning circuit for tuning of kinetic energy harvesters without the need of a battery. A nonlinear control scheme, composed by two linear controllers, is used to control the average value of the input current, enabling the synthesization of complex loads. The converter, along with the control system, is validated through SPICE simulations using the LTspice tool. The converter model and the controller transfer functions are derived. From the simulation results, it was found that the input current distortion increases with the introduced phase shift and that, such distortion, is almost entirely present at the zero-crossing point of the input voltage.

Keywords : average current control, boost converter, electrical tuning, energy harvesting

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