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# Modulator for Resonant Link Converters

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# United States Patent [19]

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- [54] **MODULATOR FOR RESONANT LINK CONVERTERS**
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- [52] U.S. Cl. .... **363/98; 363/41**
- [58] Field of Search ..... **363/17, 41, 98, 363/132**

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### [57] ABSTRACT

A modulator for resonant DC link and other power converters is provided having superior performance and general applicability to multi-phase converters. The modulator includes three major components: (1) a multi-input, multi-output linear system, (2) a quantizer, and (3) a latch. The linear system receives multiple reference signal waveforms and multiple feedback signal waveforms representative of the modulator output as input signals and produces multiple linear output signals derived from the difference between the reference and feedback waveforms as outputs. The linear system is preferably a second order system. The quantizer assigns the continuous output of the linear system to one of a finite set of discrete output vectors. The output of the quantizer is latched at a sampling rate synchronized with the times of zero voltage or current on the DC bus of the converter. The latched outputs are used as both control signals, to control the inverter output switching devices, and to derive the feedback waveform signals provided to the linear system. The modulator may be provided as part of a resonant DC link inverter or as part of a control system for such an inverter.

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**38 Claims, 12 Drawing Sheets**

