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**Rincon-Mora**

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(54) **INTEGRATED LOW RIPPLE, HIGH FREQUENCY HYSTERETIC CONTROLLER FOR DC-DC CONVERTERS**

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(51) **Int. Cl.**<sup>7</sup> ..... **G05F 1/40; G05F 1/613**

(52) **U.S. Cl.** ..... **323/282; 323/222**

(58) **Field of Search** ..... **323/282, 284, 323/285, 286, 287, 222; 363/21.01, 17, 16, 97, 89**

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(57) **ABSTRACT**

The present invention relates to a hysteretic dc-dc converter circuit comprising a buck converter circuit having an output which forms an output of the converter circuit and a hysteretic comparator circuit having an output coupled to an input of the buck converter circuit and a first input coupled to the output of the converter circuit. The converter circuit also comprises a feedback circuit coupled between the output and a second input of the hysteretic comparator circuit. The feedback circuit generates a feedback ramp signal which is a function of an output of the hysteretic comparator circuit and which is out of phase with respect to the output of the converter circuit. The output feedback coupled with the ramp signal feedback provide for an increased hysteretic comparator trip frequency, thus increasing a natural frequency of the converter circuit without requiring an alteration of the hysteretic window. The present invention also relates to a method of increasing a natural frequency of a hysteretic dc-dc converter circuit. The method comprises initiating operation of a buck converter circuit and feeding back an output signal of the buck converter circuit to a comparator circuit. The method also comprises generating a feedback ramp signal which is out of phase with the output signal, feeding back the generated feedback ramp signal to the comparator circuit, and generating a comparator output signal based on the output signal and the generated feedback ramp signal. Such feedback results in an increase in a trip frequency of the comparator and thus increases a natural frequency of the converter circuit.

**8 Claims, 6 Drawing Sheets**

























