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Method for Regulating An Electrical Power Circuit And Electrical Power Regulating Apparatus

Communications & Information

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Consumer Electronics

Digital Broadcasting, Telecommunication and Optoelectronics

Electricity and Power Electronics

Energy Conservation/Generation/Management/Storage (Battery)

Opportunity

The basic principle of performing maximum power transfer is that the load impedance is the complex conjugate of the source's output impedance in Thevenin's equivalent circuit and the load admittance is the complex conjugate of the output admittance of the source in Norton's equivalent circuit. Therefore, the load reactances have to be frequency-dependent. The present invention relates to using an active circuit that can keep extracting maximum power from the source, independent of the operating frequency. It is particularly suitable for applications like energy harvesters and power factor correctors.

IP Status
Patent granted

Technology Readiness Level (TRL) 2

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Technology

The current invention uses an active circuit that can keep extracting maximum power from the source, independent of the operating frequency. Moreover, it is unnecessary to know the values of the source resistance, inductance, and capacitance a priori. The idea is based on using a voltage source with a power converter to connect to the output terminals of the equivalent circuit. The power converter will generate necessary voltage waveforms to counteract the voltage drops of the source reactances and emulate a resistor equivalent to the source resistance to ensure maximum power transfer conditions from a voltage source.

Advantages

- It is unnecessary to know the intrinsic parameters about the output impedance of the source to locate the maximum power transfer point of the circuit.
- The maximum power point is located by sensing the extrinsic variables only, without probing the intrinsic variables inside the circuit. Specifically, only the terminal voltage and current are required.

Applications

- The invention can extract true maximum power from energy harvesters.

- It can be applied to general electric circuit for controlling the power flow, such as power factor corrector.