

Single Phase Passive Rectification Versus Active Rectification Applied to High Power Stirling Engines



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SINGLE PHASE PASSIVE RECTIFICATION VERSUS ACTIVE RECTIFICATION APPLIED TO HIGH POWER STIRLING ENGINES

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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 22 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. Stirling engine converters are being considered as potential candidates for high power energy conversion systems required by future NASA explorations missions. These types of engines typically contain two major moving parts, the displacer and the piston, in which a linear alternator is attached to the piston to produce a single phase sinusoidal waveform at a specific electric frequency. Since all Stirling engines perform at low electrical frequencies (less or equal to 100 Hz), space explorations missions that will employ these engines will be required to use DC power management and distribution (PMAD) system instead of an AC PMAD system to save on space and weight. Therefore, to supply such DC power an AC to DC converter is connected to the Stirling engine. There are two types of AC to DC converters that can be employed, a passive full bridge diode rectifier and an active switching full bridge rectifier. Due to the inherent line inductance of the Stirling Engine-Linear Alternator (SE-LA), their sinusoidal voltage and current will be phase shifted producing a power factor below 1. In order to keep power the factor close to unity, both AC to DC converters topologies will implement power factor correction. This paper discusses these power factor correction methods as well as their impact on overall mass for exploration applications. Simulation results on both AC to DC converters topologies with power factor correction as a function of output power and SE-LA line inductance impedance are presented and compared. This item ships from La Vergne, TN. Paperback.



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