Abstract

Most of the power electronic equipments are operated with dc supply. For reliable and stable operation, dc supply should be regulated. The regulation can be performed using buck, boost, Čuk, Sepic, Flyback regulators. Except single phase rectifier with resistive load all other rectifiers input currents are non sinusoidal in nature. This front end current distortion of rectifier converter leads to low power factor, high THD, distribution system losses, neutral harmonic currents, over rated power equipments in a power system. Researchers have developed methods to reduce above mentioned problem. But large size and bulky filter are their drawbacks. Generally, boost converter topology is used at the output to overcome the limitation of three phase diode bridge rectifiers. But this arrangement provides only greater output voltage than input voltage. Few other topology like buck-boost, Čuk, flyback converters have been proposed to offer step up or down capability to meet the requirement. Not many studies have been reported in literature to make input current waveshaping of the rectifier converter using SEPIC. The aim of this research is to develop a Sepic regulator with improved input current quality for low THD and good power factor to ensure better efficiency for the system. In this work, a detailed study has been carried out to investigate the effect of ac to dc converter on input current that eventually injects harmonics into the power system. Various topologies of the converter with input and output passive filter arrangements have been investigated and it has
been found that passive filters no longer provide optimal THD, input power factor and efficiency. Finally, a single ended primary inductor converter (SEPIC) has been proposed. The performance of the SEPIC with and without passive filter has been investigated through ORCAD simulation. It is seen that SEPIC with input passive filter provides best performances in terms of THD, input power factor and efficiency for the rectifier arrangement.

References


Index Terms

Computer Science
Power Electronics
Keywords
Power Factor Correction  THD  ORCAD  SEPIC