A Single Switch Battery Charger with Active Power Filter

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ABSTRACT

This paper present the battery chargers with active power filter for minimizing the input current distortion in a single phase system. The striking feature of this circuit is that it contains only a single switch. The active power filter here is use to mitigate the distortion current by injecting equal but opposite current to shape the pulsating of the supply current to a sinusoidal form that is in-time phase with the supply voltage. The error signal from the supply current is fed into the APF (active power filter). The supplied current would be subtracted by another reference current generated to produce this error signal. The output of the subtraction is then compared to a triangle waveform that resembles a carrier wave to produce a PWM (pulse width modulation) signal that is injected into a switching device. The APF will be implemented fully by the microcontroller PIC16F877A. In this work, the single switch active power filter is used to reduce switching stress, losses and also the cost.

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CHAPTER 1

INTRODUCTION

1.1. INTRODUCTION

Power electronic is the technology of converter electric power from one form to other using electronic power device. Several type of solid state power semiconductor devices have been develop in recent years, making it possible to build efficient power converters with excellent facility for control of output parameter, such as voltage, current and frequency. In static power converter, the power semiconductor devices function such as switches, which operate statically, that is without contact moving contact. The times duration, as well as the turn ON and turn OFF operations of these switches, are controlled in such a way that an electrical power source at the input terminal of the converter appears in a different form at its output terminals. In most types of semiconductor, the individual switches in the converter are operated in a particular sequence in one time period, and this sequence is repeated at the switching frequency of the converter [1].

Power electronics propose to control and conversion of electrical power by power semiconductor devices where these devices operate as switches. The task is to process and control the flow of electric energy by supplying voltages and current in a form