CHARACTERISTICS BEHAVIOUR OF ADJUSTABLE SPEED INDUCTION MOTOR DRIVE SYSTEM USING SIMILAR SPWM RECTIFIERS

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Abstract

This paper presents the development of design, modelling and simulation of Single-Phase to Three-Phase Induction Motor Drive System Using Two Parallel Sinusoidal PWM Rectifiers. These are simulated through computer software tool using MATLAB/SIMULINK. This presents the development of design, modelling and simulation for achieving voltage balancing to the output drive. The proposed method uses the same hardware structure which consists of a converter and inverter sections, In between the Converter and inverter two parallel switching device be connected through inductor and capacitor where used to produce balanced output to the motor drive. The proposed method with an advanced switching technique gives a better output with fewer harmonics. A filter is also used in the output side to further reduce the harmonic values. The output is compared between the conventional and proposed methods. The output waveforms are presented.

Keywords: Pulse Width modulation (PWM), Voltage Source Inverter (VSI), Total Harmonic Distortion (THD), Weighted Total Harmonic Distortion (WTHD) Source, Fault Identification System (FIS)

INTRODUCTION

A single phase to three phases Driver system includes Rectifier and Inverter. Rectifier is an electrical device that converts alternative current (AC), which periodically reverses direction, to direct current (DC) which flows in only one direction. The process is known as rectification. Three phase inverters are used for variable frequency drive applications and for high power applications such as HVDC power transmission. A basic three-phase inverter consists of three single-phase inverter switches each connected to one of the three load terminal [1]. For the most basic control scheme, the operation of the three switches is coordinated so that one switch operates at each 60 degree point of the fundamental output waveform [3]. The six-step waveform has a zero-voltage step between the positive and negative sections of the square-wave such that the harmonics that are multiples of three are eliminated as described above. When carrier-based PWM techniques are applied to six-step waveforms, the basic overall shape, or envelope, of the waveform is retained so that the 3rd harmonic and its multiples are cancelled [3].

CIRCUIT DESCRIPTION OF THE PROPOSED SYSTEM

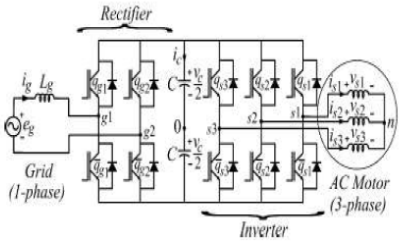

Figure: 1 Single Phase to Three Phase Driver system

Figure shows a block diagram representation of a power conditioning stage, where the input is a low frequency ac source which is converted to DC by an AC to DC converter (rectifier) stage. The DC voltage obtained is again converted to single phase or three phase AC voltage of required magnitude and frequency in a DC to AC converter (inverter) stage. The DC link in any AC-DC-AC converter is normally equipped with an electrolytic capacitor which provides decoupling between the rectifier and the inverter [4]. However, the DC link capacitor is a large, heavy, and expensive component. Moreover, the DC bus capacitor is the prime factor of degradation of the system reliability. For space power distribution systems, factors cited above pose even more critical problems.