

Modeling and Analysis of Speed Control of Induction Motor Using PWM

Rekha Ghadage^a, Komal Jadhav^a, Siddhesh Kevalram^c, Manasi P. Deore^{*}

^{a,b,c} Students, Department of Electrical Engineering, JSPM's BSIOTR, Wagholi, Pune-412207, India.

^{*}Assistant Professor, Department of Electrical Engineering, JSPM's BSIOTR, Wagholi, Pune-412207, India.

Abstract

Speed control of Induction Motor is another system. It has high-effectiveness which drives AC Induction Motor with PWM tweaked sinusoidal voltage and plan of a low cost. Circuit is constrained by utilizing ATmega family microcontroller. The circuit is equipped for providing three-phase Induction Motor with differing AC voltages. The mains i.e inputs to motor is modulated. It requires a lower number of passive and active parts which contrasted and expensive converter. This proposed control system is use in consumer's what's more, modern items like clothes washer, dishwashers, ventilators, blowers.

Keywords- Microcontroller, Opto-isolator, MOSFET, Induction Motor.

1. Introduction

Induction Motor are broadly utilized in mechanical, commercial, personal or residential application, utility application. It is utilized in different applications on the grounds that the motor have low cost, high effectiveness, wide speed go and robustness. In the present time, in the vast majority of the applications, AC machines are valuable than DC machines because of their basic and most hearty development without any mechanical commutators. Motor control applications range everything from private clothes washers, fans, what's more, car window lift, footing control frameworks and different modern drives. In numerous modern applications in which Induction Motor are bolstered by static recurrence inverters is developing quick. Accordingly electric motor is most vital part. A complete generation unit have three fundamental part driven (working) machine, transmitting gadget and electric motor. An electric motor is wellspring of intensity. Power from electric motor to driven is conveyed by transmitting gadget. The electric motor is named :

1. Air conditioning motor.
2. DC motor.

In this task paper microcontroller based framework to control speed of Induction Motor is created utilizing beat width tweak procedure. The electric motor speed is fixed when AC motor is associated with AC line. Speed is determined by:

$$N_s = 120 * f / p - \text{slip}$$

N_s = motor speed, f = frequency, p = number of posts.

Presently speed of motor should be change in numerous applications. So beat width regulation strategy is progressively effective and beat width regulation strategy gives more elevated amount of execution. Speed of motor can be balanced by changing the recurrence connected to motor.

The Power semiconductors were used as switching devices that are combined together to make inverters. Ac loads requires variable voltage at input end. When ac loads are energized by inverters. It is essential that output voltage control to provide a required power supply. This involves with the change input dc voltage for a voltage regulation of the inverters and for the constant voltage/frequency requirement. Since two types of inverters were available. Voltage source inverters (VSI) and current source inverters. Based on the supply we classify the inverters as 1 phase inverter and 3 phase inverter [1]. When the power semiconductor switches were switched ON, if frequency affect and pre-existing voltage distortion will affect the quality power. A well tuned filter is able to suppress those effects. A filter design incorporate an isolating transformers and the designed complimentary controller by rejects the voltage distortion and offer the good power quality[2].LCL filters is designed to mitigate harmonic issues. Which are predominantly used to eliminate harmonics with small size and weight [3]. Small signal linear models were presented for variable frequency, constant on time and variable frequency constant off time those modulation methods were used to control a switching action of the power semiconductor switches [4]. A Quasi Z-source cascaded multilevel inverters is used with a photovoltaic power system that overcomes the demerits of conventional cascaded multilevel inverters by a balanced DC-Link voltage [5]. A modernized control using pulse 2 International Journal of Pure and Applied Mathematics Special Issue width modulation technique (PWM) was applied for inverters that may act as custom power devices like dynamic voltage restorer [6]. Gate signals to the switches for the semiconductor switches determine the harmonic substance of the output. Various types of gating signals have been used in the literature; most

primitive of them has been Pulse Width modulation schemes. Joachim Holtz has carried out a comprehensive analysis of the various types of PWM techniques such as carrier based PWM and non-carrier based PWM, various parameters namely harmonic spectrum, torque harmonics and dynamic performance for analyzing the performance for different PWM techniques have been discussed [7] [8]. Since inverters were applied in distributed generation due to the lack of fossil fuels the distributed power generation made a makeable concentration in which the role of inverters is very important several topologies of inverters [9].

2. Pulse Width Modulation

Pulse Width Modulation (PWM) techniques for two level inverters have been used broadly during the past years. Many different PWM techniques are used to achieve the objectives given below; lesser total harmonic distortion, reduced switching loss, wide linear modulation range in the spectrum of switching waveform and simple implementation. The two most widely used PWM schemes for inverters are the carrier based PWM techniques and the space vector based PWM techniques. These modulation techniques are widely studied. The SPWM schemes are flexible and simple to implement, however the maximum peak of the fundamental component in the output voltage is limited to 50% of the DC link voltage. A voltage source inverter with a MOSFET semiconductor. In the simplest approach, the top switch is turned on. If turned on and off only once in each cycle, a square wave waveform.

3. Methodology

In this project a new speed control technique for three phase induction motor. It has low cost, high efficiency drive capable of supplying a single phase induction motor with PWM modulated sinusoidal voltage. The circuit operation control by an ATmega microcontroller. The device is aimed at substituting commonly used MOSFET phase angle control drives. The circuit is capable of supplying three phase

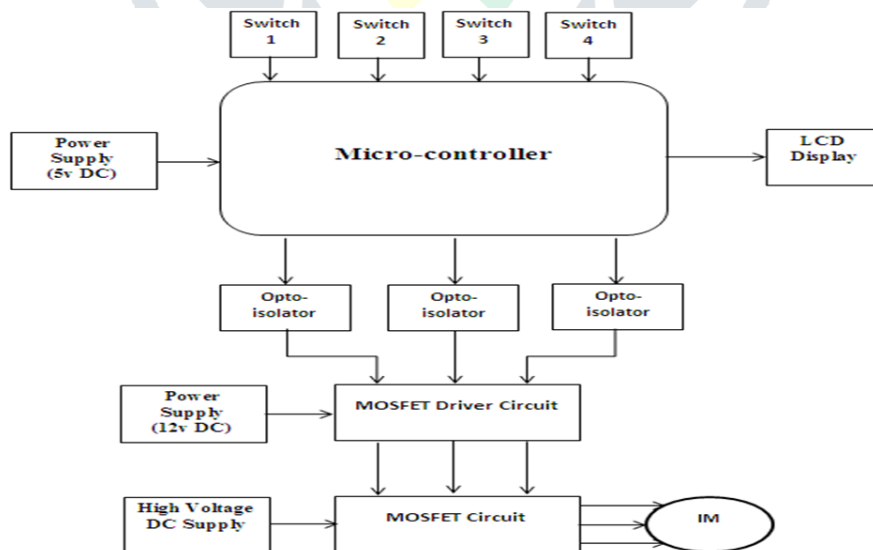


Fig1. Block diagram of system

induction motor with varying AC voltage. We are generating pulses through microcontroller which are further provided to opto-isolator used to drive MOSFET. Depending on this PWM is generated at the output of MOSFET which is further given to input of induction motor.

It is same as in TRIAC control, the voltage given to load can be differed from zero to most extreme value. On the opposite side, a pulse width modulation technique (PWM) is utilized and it is contrasted and the stage point control and utilized for MOSFET, it delivers much lower high order harmonics. Since the circuit is gone for ease, medium-control applications, to deliver the yield voltage waveform it doesn't utilize an ordinary converter topology. It regulates the mains AC voltage. As contrasted and expensive converter, it requires least number of passive and active power se components. The device endeavored here exploits both the minimal effort of the stage point control and the base symphonious content and more noteworthy proficiency which get standard converter topology. The drive uses a PWM controlled MOSFET then the load in series with a bridge rectifier. This drive based on this proposed control method is utilized in buyer and mechanical items like fan, clothes washer, dishwashers, ventilators and so on.

4. Conclusion

PWM is the best technique to control speed of induction motor. We had implemented the same PWM based system with the help of microcontroller and MOSFET. So by implementation of such system user can use motor as per their requirement.

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