

## Integration of Virtual Learning of Induction Machines for Undergraduates

**Authors :** Rajesh Kumar, Puneet Aggarwal

**Abstract :** In context of understanding problems faced by undergraduate students while carrying out laboratory experiments dealing with high voltages, it was found that most of the students are hesitant to work directly on machine. The reason is that error in the circuitry might lead to deterioration of machine and laboratory instruments. So, it has become inevitable to include modern pedagogic techniques for undergraduate students, which would help them to first carry out experiment in virtual system and then to work on live circuit. Further advantages include that students can try out their intuitive ideas and perform in virtual environment, hence leading to new research and innovations. In this paper, virtual environment used is of MATLAB/Simulink for three-phase induction machines. The performance analysis of three-phase induction machine is carried out using virtual environment which includes Direct Current (DC) Test, No-Load Test, and Block Rotor Test along with speed torque characteristics for different rotor resistances and input voltage, respectively. Further, this paper carries out computer aided teaching of basic Voltage Source Inverter (VSI) drive circuitry. Hence, this paper gave undergraduates a clearer view of experiments performed on virtual machine (No-Load test, Block Rotor test and DC test, respectively). After successful implementation of basic tests, VSI circuitry is implemented, and related harmonic distortion (THD) and Fast Fourier Transform (FFT) of current and voltage waveform are studied.

**Keywords :** block rotor test, DC test, no load test, virtual environment, voltage source inverter

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