IET-UK YMS CHENNAI NETWORK

Technical Event Report 2009

Experimental Analysis of load test of Induction Motor

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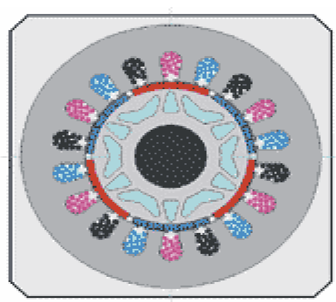
Abstract:-

With the advent of low-cost personal computers and various easily accessible software packages, computer- aided teaching tools have become an essential part of both classroom lectures and laboratory experiments in electrical machinery education. The computer models and simulations of induction motors, as teaching tools, support the classroom teaching by enabling the instructor, through the computer-generated graphics, to illustrate easily steady-state operation of the motor under various loading conditions. This paper describes PSCAD implementation of three induction motor tests performed. These simulation models are compared with the practical laboratory experiments.

Induction Motor:-



The AC induction motor is a rotating electric machine designed to operate from a three-phase source of alternating voltage. The stator is a classic three phase stator with the winding displaced by 120°. The most common type of induction motor has a squirrel cage rotor in which aluminum conductors or bars are shorted together at both ends of the rotor by cast aluminum end rings. When three currents flow through the three symmetrically placed windings, a sinusoid ally distributed air gap flux generating the rotor current is produced. The interaction of the sinusoid ally distributed air gap flux and induced rotor currents produces a torque on the rotor. The mechanical angular velocity of the rotor is lower than the angular velocity of the flux wave by so called slip velocity.

Experiment Details:-

A three-phase power supply is connected to a three -phase 230 V induction motor. This motor is mechanically coupled to a dc generator which represents a mechanical load such as a fan or pump. The dc generator has its field excited by a dc power supply.

Induction Motor Squirrel-Cage Induction Motor which you have to parameterize. The Stator winding is assumed to be Y connected with the access to the phase terminals. This motor should be mounted on the Motor Bench, wherein the motor shaft may be coupled to the Dynamometer for taking the Measurements.

.**Name Plate details of the induction Motor:-**

Parameter	Rating
Rated voltage	230V
Rated Current	9.9AMPERE
Power	1.5KW
Speed	1500RPM
Frequency	50Hz
Pole	4

Formula:-

Frequency, *f*, the number of poles, *p*, and the synchronous speed (speed of rotating field), n_s is given by:

$$f = \frac{pn_s}{120}$$

From this relationship:

$$\text{Synchronous speed, } n_s = \frac{120f}{p} \quad [\text{rev/min}]$$

The rotor speed is:

$$\text{Rotor speed, } n_r = n_s(1 - s)$$

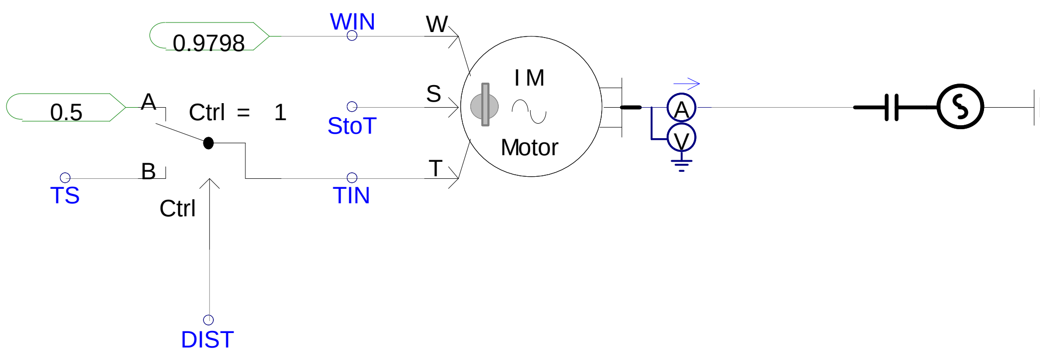
Where *s* is the *slip.*

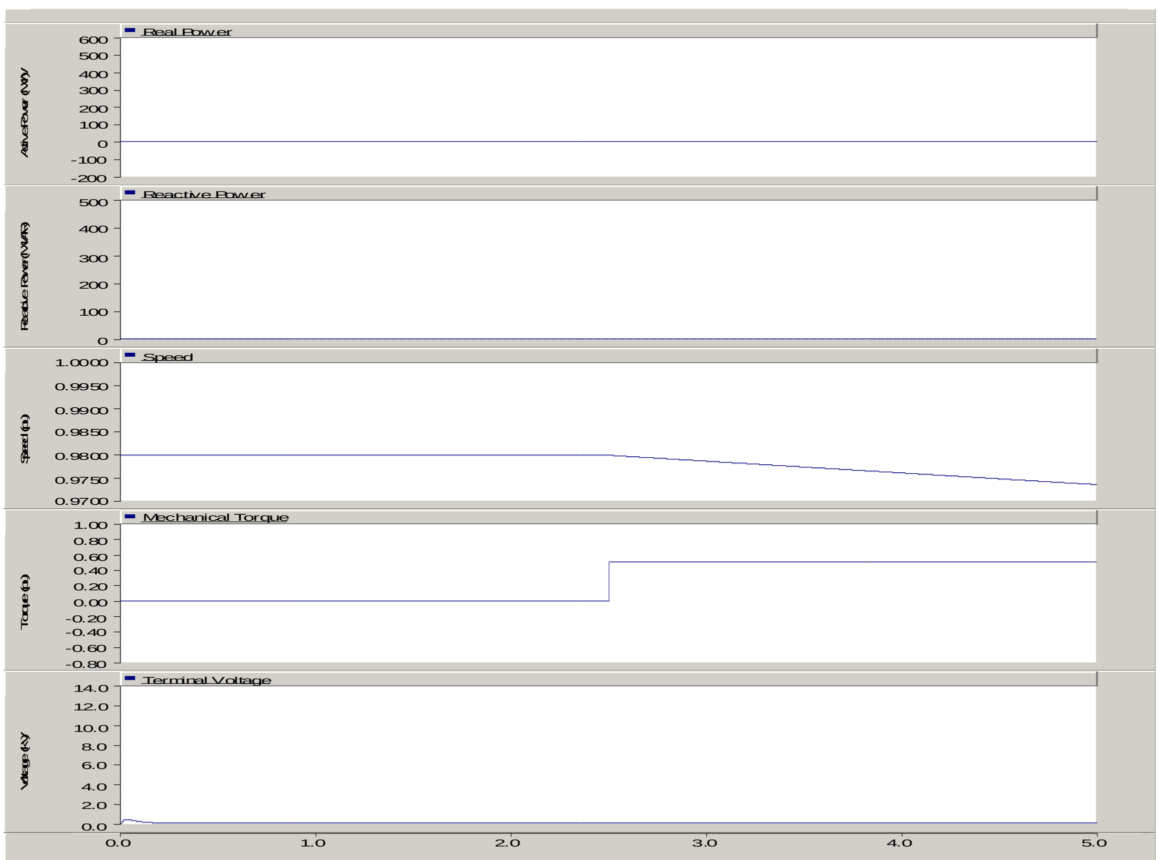
Slip is calculated using:

$$s = \frac{n_s - n_r}{n_s}$$

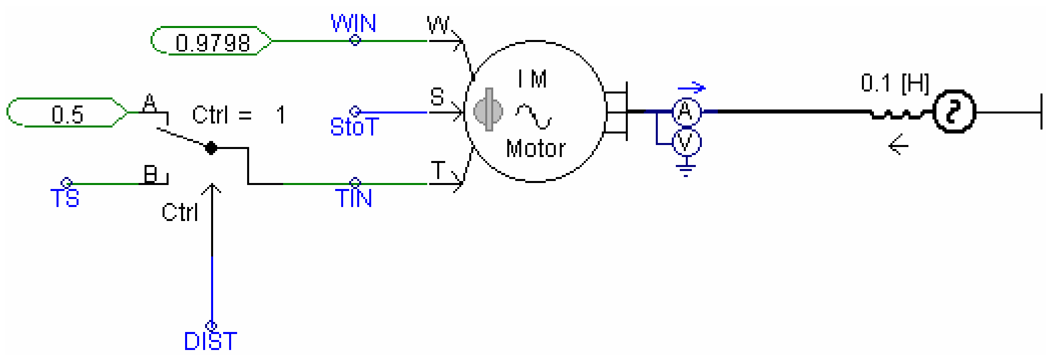
A synchronous motor always runs at synchronous speed with 0% slip.

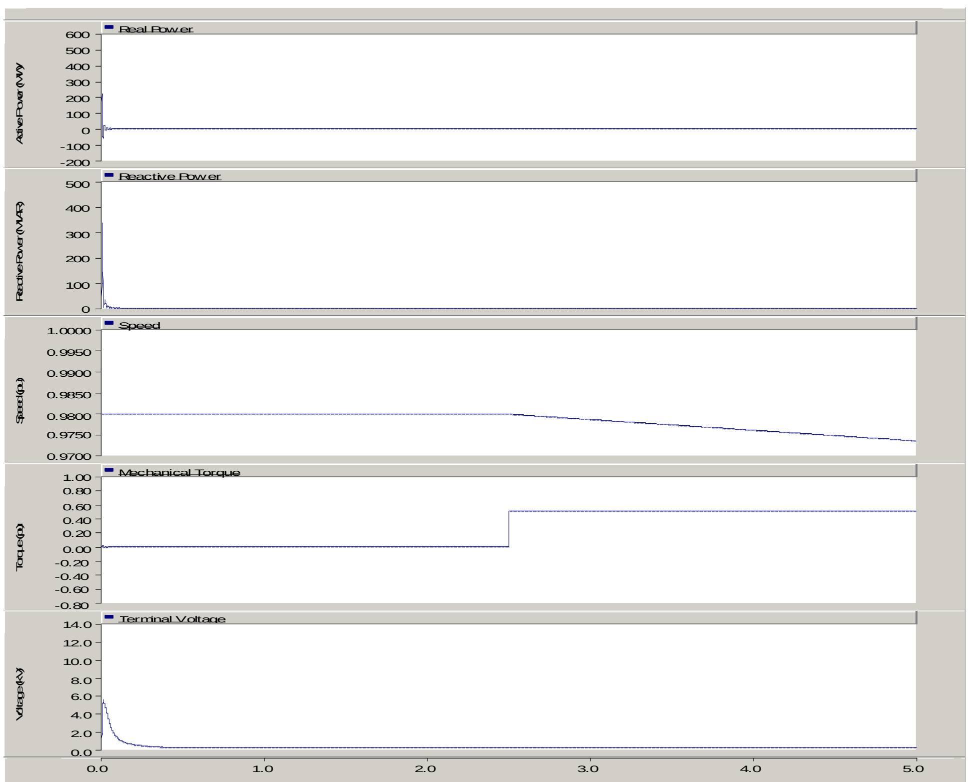
Induction Motor capacitive load Test:-



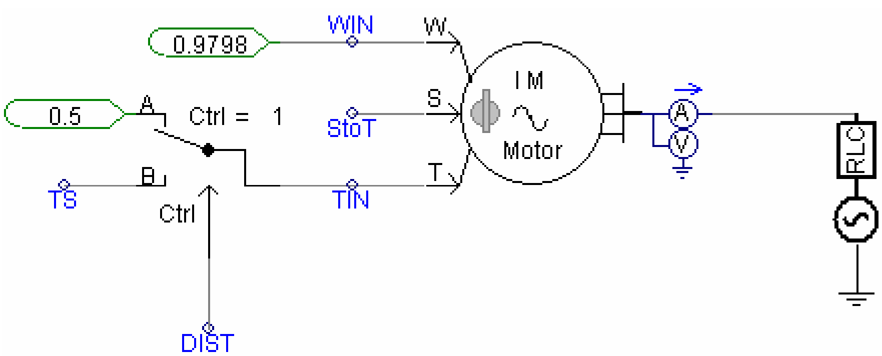


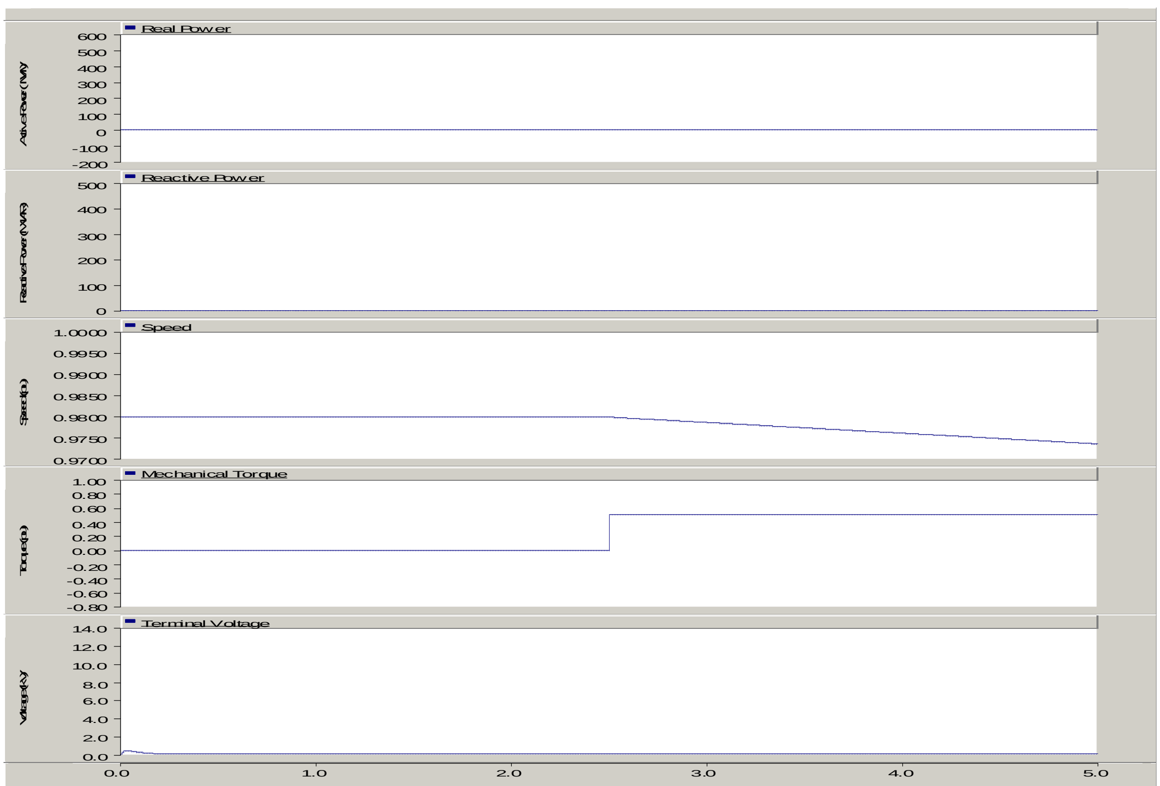
Induction Motor inductive load Test



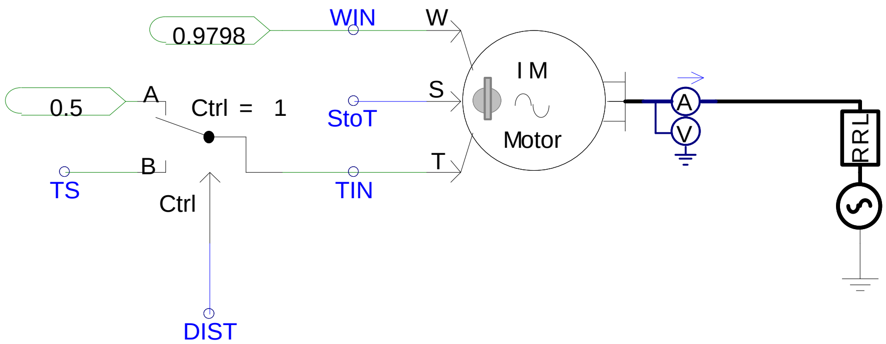


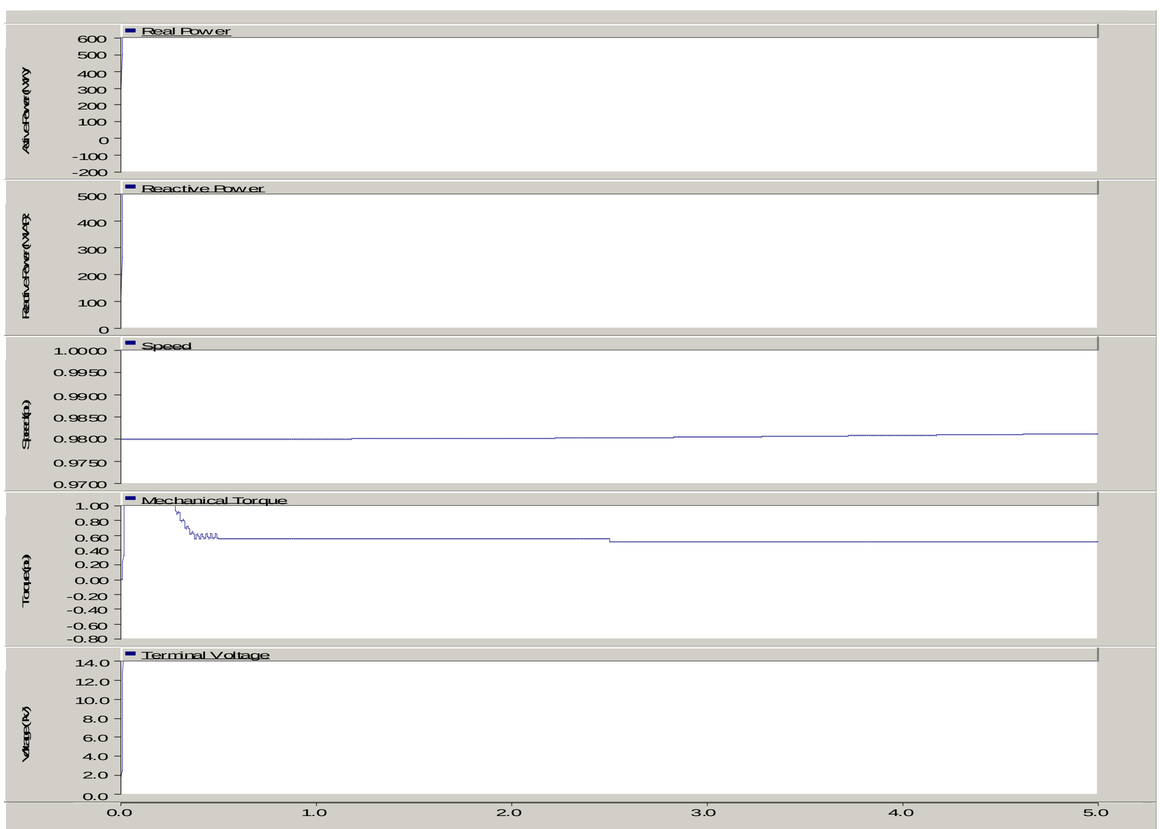
Induction Motor RLC load Test



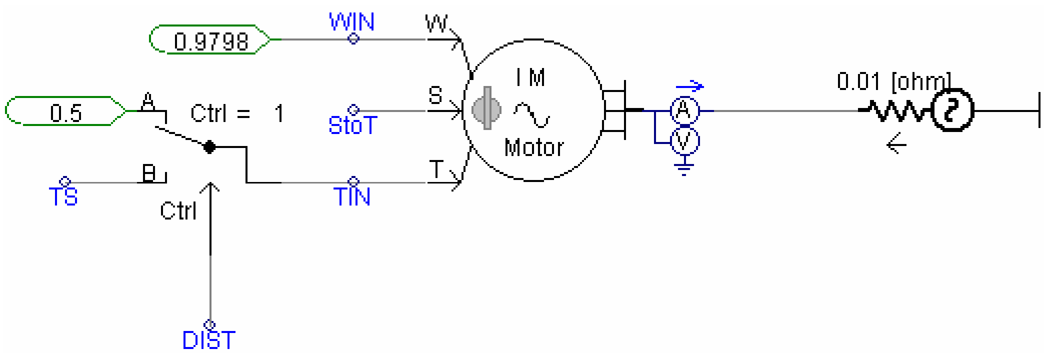


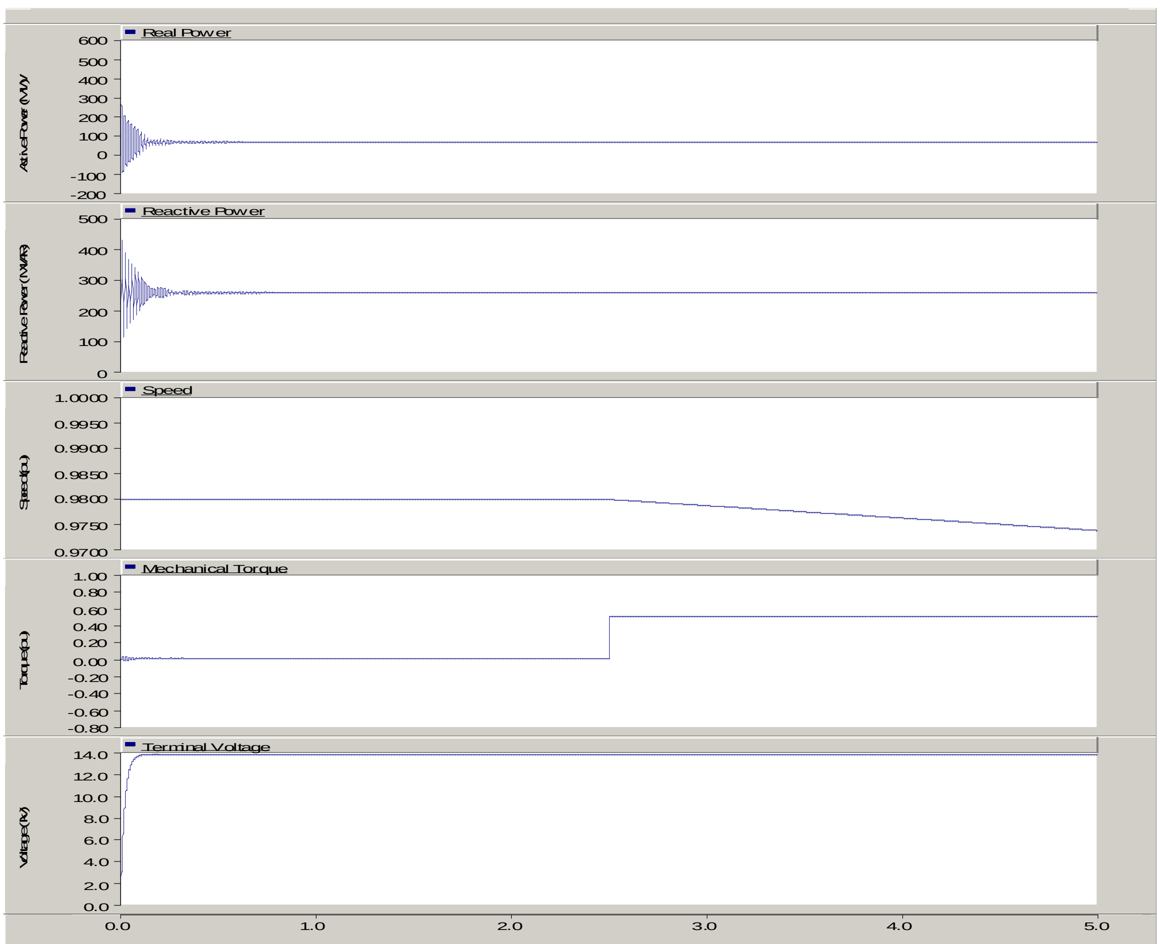
Induction Motor RL load Test



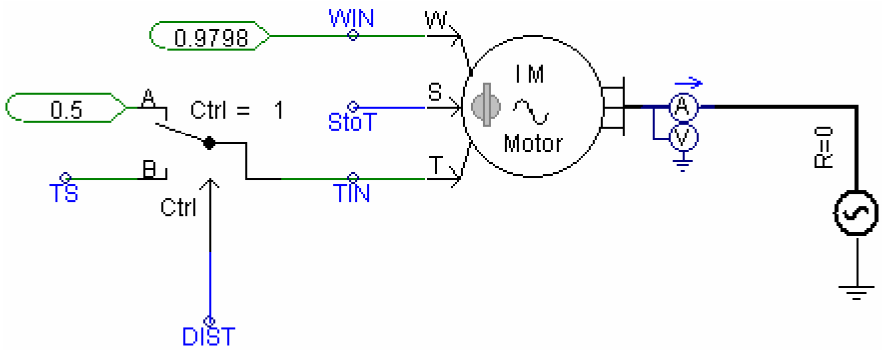


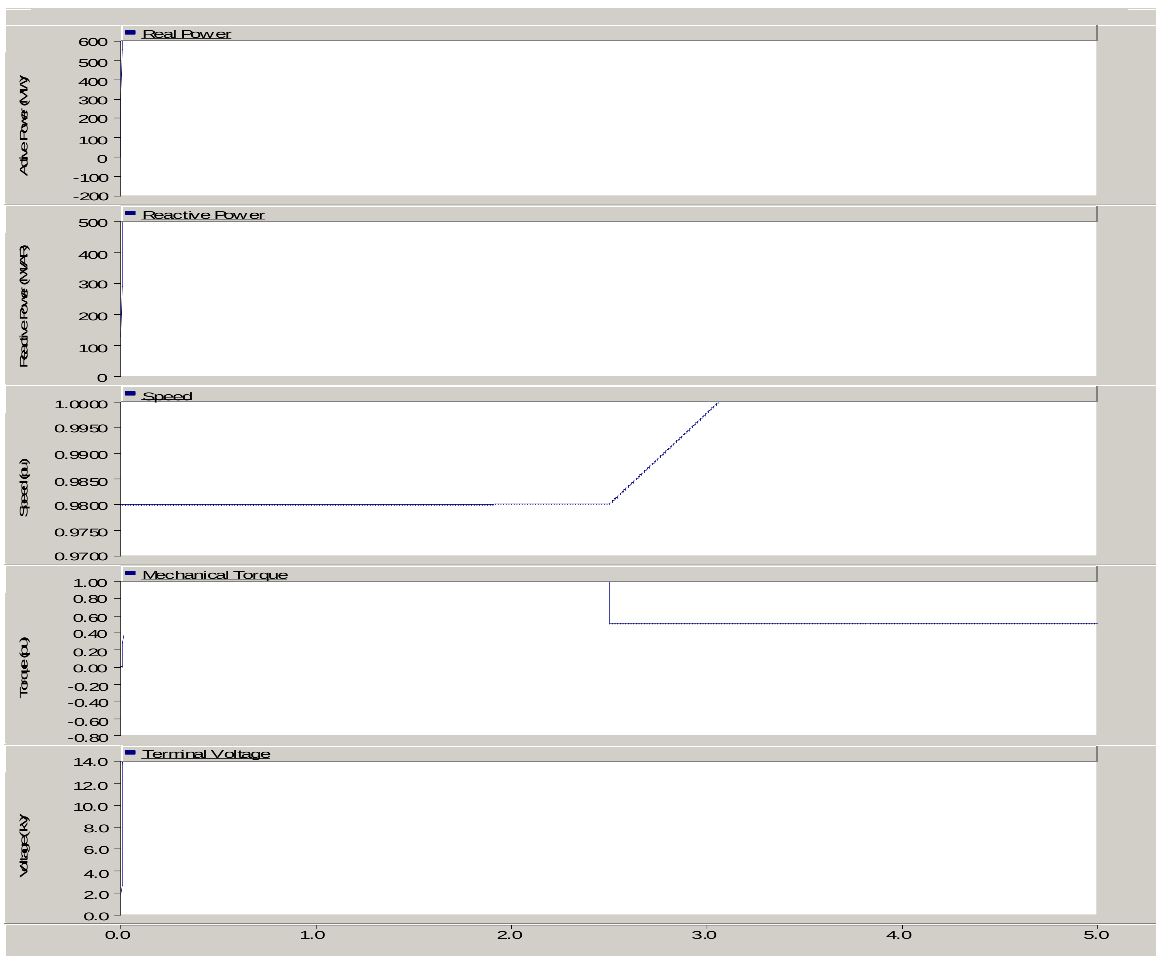
Induction Motor R load Test





Induction Motor ideal load Test





Comprising:-

Parameter	Particle result	PSCAD Result	% Error
Im[A]	1.4850.13	1.345	10.40
Ic[A]	0.135	0.113	19.496
Rc[Ω]	900	2010	55.224
Lm[H]	0.230	0.323	28.793
pf	0.090	0.084	7.143

Conclusion:-

We assume that the PSCAD result provided us with more accurate results; therefore the percent error is expressed with respect to those results. The percent error between the tests is reasonable for each parameter with the exception of core equivalent resistance.