# PERFORMANCE OF SPEED SENSORLESS CONTROL ALGORITHMS FOR INDUCTION MOTORS – A COMPARATIVE STUDY

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The induction motor (IM) has been the workhorse of the industry for many years, because of its low cost, high reliability, low inertia and ruggedness. As a consequence, a considerable amount of electricity generated in an industrial power system is consumed by induction motors. It is a well-known fact that the energy consumption of the IM can be reduced by operating it as a Variable Speed Drive (VSD). However, VSDs are still not popular among industrialists mainly due to higher manufacturing cost.

Several researches are conducted in order to investigate the possibility of eliminating the shaft mounted speed sensor of a VSD as a measure to reduce the production cost and also to eliminate the cabling costs associated. In this paper, a comparative study of performance of some speed sensorless control algorithms for IMs will be presented.

Eliminating the speed sensor without degrading performance of IM VSD based on vector control principle is still a challenge for researchers, the reason being the essential need of speed information to implement such a drive system. Several estimation techniques have been proposed in the literature for this purpose. However, a comparative study of these algorithms at different levels such as, analysis, simulation, real-time performance, etc. is still lacking. This paper will investigate two estimators, namely, MRAS based speed estimator, and Lunenburg speed estimator.

The performance of each technique at various operating conditions such as starting, braking, speed reversal, accelerating and decelerating will be investigated. Special attention is given to the load torque disturbance rejection capability at different speed ranges. Both simulation and experimental results will be discussed in this paper. Finally, limitations of each algorithm especially at very low speed range will also be identified.