

Dynamic Simulation of the Single-Phase Induction Motor

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Abstract— In this paper a dynamic model in holonomic reference frame for a single phase induction motor is derived. First the simplifying assumptions and holonomic reference system are described. Due to unsymmetrical single phase induction machine, a quasi holonomic system is adopted and the magnetic voltage is determined. Afterwards, the air gap fluxes are calculated and the flux linkage equations are derived. Hence, the motors voltage equations are obtained. The torque equations are added and the full model is determined. Also a method of inserting an AC capacitor in series with the auxiliary winding is presented. Knowing the motor's electrical parameters, the model is implemented in Matlab and motors representative curves are plotted. Experimental tests were performed with the single phase induction motor and a computer controlled hysteresis dynamometer. The simulated graphs are confirmed by the experimental data. The experimental curves obtained using the single phase induction motor and the high speed test bench are presented in the last part of the article.