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Parameter Identification Method of PMSM Based on SVPWM Inverter

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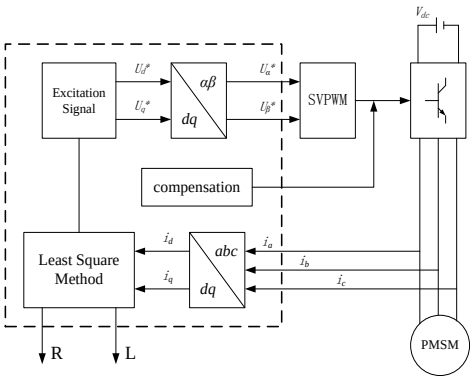
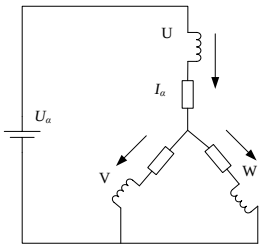
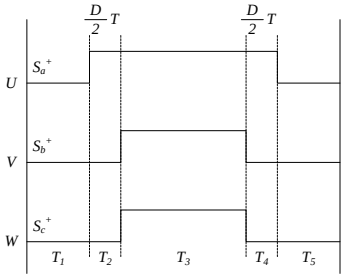
Principle of Parameter Identification







(1) Stator resistance R_s

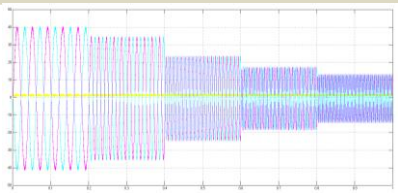
At the initial stage, DC excitation voltage U_α is injected into the PMSM, and the current signal I_α on the PMSM is collected.

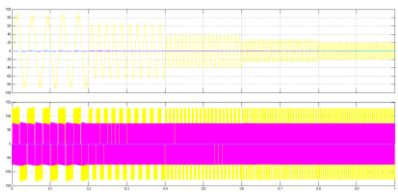
(2) *D*-axis inductance L_d and *Q*-axis inductance L_q

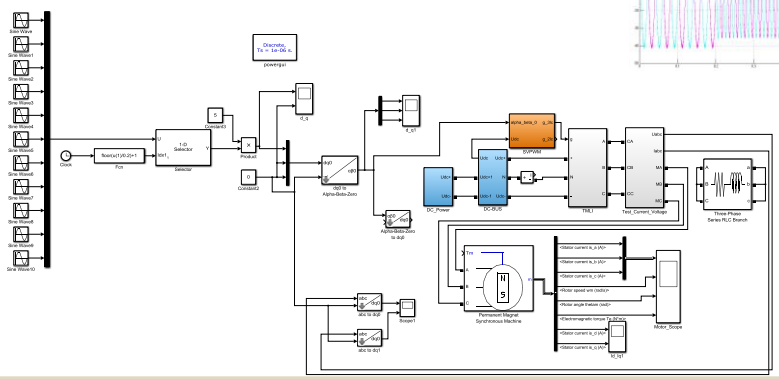
$$U_d = R_s I_d + L_d \frac{dI_d}{dt} \quad , \quad U_q = R_s I_q + L_q \frac{dI_q}{dt}$$

least Square Method → L_d L_q

Simulation Analysis







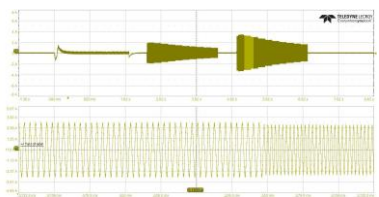
(1) resistance identification

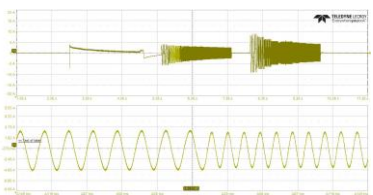
The identification error of R is 0.165% and the identification error of L is 0.833%.

(2) PMSM identification

The identification errors of R_d, L_d, R_q, L_q are respectively 1.64%; 0.22%; 5.88%; 0.13%.

System Experimental Verification





(1) resistance identification

The identification value is as follows: R=2.588Ω; L_d=0.768mH; L_q=0.751mH, identification error ≈3.52%~9.71%.

(2) PMSM identification

The identification value was obtained as follows: R=0.097Ω; L_d=2.104mH; L_q=2.125mH, identification error ≈1.19%~11.8%.

Conclusion

In the analysis of the influence of dead zone and power device voltage drop on the identification of motor parameters, a compensation method is proposed, and based on SVPWM inverter, the identification of motor resistance and inductance is realized by the principle of least square. The correctness of the identification algorithm is verified by simulation and system experiment respectively, and the verification results show that the identification error of the method meets the accuracy requirements of engineering applications.