Abstract

A novel Current Controlled Space Vector Pulse Width Modulation (CCSVPWM) technique for Brushless Direct Current (BLDC) motor drives, with a view to reduce torque ripple is proposed.
The current ripple, created due to the stator winding inductance, leads to generation of ripple in
the torque and prevents the usage of BLDC motor in a precise servo drive system. The paper
includes MATLAB/SIMULINK results of conventional, unipolar, bipolar current control algorithms
(CCAs), varying input voltage method (VIVM) and a new CCSVPWM approach. The
comparison of simulation results reveal that the CCSVPWM technique is effective in reducing
the ripple. This control method improves the system performance with low torque ripple thus
making it suitable for immense applications employing electromechanical actuators.

Reference

- P Pillay and R Krishnan, “Modeling, simulation, and analysis of permanent-magnet motor
drives, part II: The brushless dc motor drive,” IEEE
- J. R. Hendershot JR, THE Miller, Design of Brushless Permanent Magnet Motors, 1rd
- Jahns T. M., Soong W. L., “Pulsating Torque Minimization Techniques for Permanent
- Joong-Ho Song, Ick Choy, “Commutation Torque Ripple Reduction in Brushless DC
- R Carlson, M. Lajoie-Mazenc, and J. C. S. Fagundes, “Analysis of torque ripple due to
- T. M. Jahns and W. L. Soong, “Pulsating torque minimization techniques for permanent
1996.
- Y. Liu, Z. Q. Zhu, and D. Howe, “Commutation-Torque-Ripple Minimization in
1012-1017, July/August 2007.
- Y. Sozer and D. A. Torrey, “Adaptive torque ripple control of permanent magnet brushless
DC motors,” Proc. 13th Annual Applied Power Electronics Conference and Exposition, Vol.1,
- C.T.Pan and E. Fang, “A phase-locked-loop-assisted internal model adjustable-speed
controller for BLDC motors,” IEEE Trans. on Industrial Electronics, Vol.55,No.9,pp.3415-3425,
2008.
- K.Y.Nam, W.T. Lee, C.M.Lee and J.P.Hong, “Reducing torque ripple of brushless DC
- J.Cao, B.Cao, P.Xu, S.Zhou, G.Guo and X.Wu, “ Torque ripple control of
position-sensorless brushless DC motor based on neural network identification,"in Proc.of IEEE
ICIEA, pp.752-757, 2008.
- Yong Liu, Z. Q. Zhu, “Commutation-Torque-Ripple Minimization


**Index Terms**

Computer Science

Power Electronics

**Key words**

Brushless DC motor
current controlled SVPWM technique
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