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# Acoustic noise reduction in DTC-based induction-motor drives using a unified flux and torque control

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In the vector control of induction motor usually a fixed frequency pulse with modulation (PWM) is used to make the voltage space vector. Acoustic noise in fixed frequency PWM is concentrated on harmonic energy in distinct tones. The other side, in the direct torque control (DTC) of induction motor, the voltage space vector is chosen by the direct selection of a switching vector from a look-up table. Because the DTC has no fixed frequency modulation, not only the harmonic spectrum can be spread out but also an acoustic noise can be reduced. However, the selected vector is not always the best one since only the sector is considered where the flux linkage space vector lies without considering its accurate location. This paper presents an acoustic noise reduction in DTC-based induction-motor drives and relates to earlier work concerning a unified flux and torque control method, where the flux and torque errors are geometrically put together to make a stator voltage vector in a deadbeat fashion. The look-up table in the DTC is replaced by a minimum-distance vector selection scheme to minimize the flux and torque ripples over a fixed sampling period. Acoustic noise of a fixed frequency PWM, conventional DTC and proposed unified flux and torque control method has been compared. Simulation and experimental results show that the proposed algorithm effectively reduces the acoustic noise.

## Biography

Joonhyoung Ryu has completed his PhD in Power Electronics from Ajou University, Suwon, Korea in 2005. He is a Senior Research Engineer of Korea Railroad Research Institute (KRRI). His research interests include electric machines, AC drives, power electronics and electric vehicles especially for Railways applications.

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