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Research Letter

Disturbance Observer-Based Simple Nonlinearity Compensation for Matrix Converter Drives

Kyo-Beum Lee¹ and Frede Blaabjerg²

¹School of Electrical and Computer Engineering, Ajou University, Suwon 443-749, South Korea

²Institute of Energy Technology, Aalborg University, 9100 Aalborg, Denmark

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Abstract

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Abstract

This paper presents a new method to compensate the nonlinearity for matrix converter drives using disturbance observer. The nonlinearity of matrix converter drives such as commutation delay, turn-on and turn-off time of switching device, and on-state switching device voltage drop is modeled by disturbance observer and compensated. The proposed method does not need any additional hardware and offline experimental measurements. The proposed compensation method is applied for high-performance induction motor drives using a 3 kW matrix converter system without a speed sensor. Simulation and experimental results show that the proposed method using disturbance observer provides good compensating characteristics.