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## **Bidirectional Harmonic Current Control of Brushless Doubly Fed Motor Drive System Based on a Fractional Unidirectional Converter Under a Weak Grid**

In this project, the Brushless Doubly Fed Machine (BDFM) drive system based on a fractional unidirectional converter is a promising low-cost variable-speed drive system, which shows great potential in applications of driving fans and pumps. However, the harmonic current generated by a diode rectifier can flow into the machine and the grid under a weak grid, which will cause a 6th-order frequency torque ripple and lead to voltage distortion. A steady equivalent circuit considering the uncontrolled rectifier and the grid impedance is built firstly to study the harmonic distribution characteristics. To eliminate the influence of harmonic currents, the harmonic equivalent impedance of the machine system should be regulated to change the harmonic distribution characteristics. This paper improves the conventional control method through adding a harmonic control loop to prevent harmonic currents from being injected into the machine or the grid, which is then applied in the fundamental synchronous frame. Two indirect parameters are selected to realize the two control targets. Afterwards, the influence of the control system on the harmonic equivalent impedance of the machine system under the conventional method and the proposed method are compared. Finally, Matlab/Simulink results obtained from a 30 kW BDFM prototype verify the proposed method

**Domain:** Power Systems \_ Hybrid Systems

**Technology:** Electrical