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## A Harmonics Elimination Method Using a Novel Three-winding Transformer for HVDC Transmission System

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**Abstract**  
 A high-voltage direct-current (HVDC) transmission system including wind within processing system has been proposed. In this system, the harmonic resonance and severity are noted in the same way as in traditional HVDC transmission system. The traditional HVDC transmission system poses a large number of harmonics in the sending and grid system and the receiving end grid system. In this paper, a novel harmonic elimination method using a three-winding transformer with negative leakage inductance for the HVDC transmission system is proposed. Also, the efficacy of the method is verified with a simulation model of the proposed transformer is developed. Finally, the proposed method is confirmed by theoretical and experimental results.

**Proposed HVDC transmission system**

**Contents of the proposed system**

- The proposed system has high efficiency.
- The system can eliminate many undesirable harmonics and severely with only one device.

**Features**

- A large number of harmonics are generated by the transformer with negative leakage inductance.

**Fig. 1. Configuration of the proposed HVDC transmission system including wind power processing.**

**Basic theory**

**A three-winding transformer with negative leakage inductance**

**Simulation results**

**Experimental results (with resistance load)**

**Experimental results (with receiving and grids)**

The output terminal voltage waveform and current waveform become nearly sinusoidal.

S.A.I.E.S.O.

