

In this paper, a new industrial direct-current (dc) power supply system with the four-winding inductively filtered rectifier transformer (FW-IFRT) is proposed based on an inductive filtering (IF) method, which can effectively solve the power quality problems generally existing in the high-power rectifier system, such as high energy consumption, serious harmonic pollution, low power factor, and so on. The single-phase equivalent circuit model of such a new system is established based on the multiwinding transformer theory, and then its operating characteristics are investigated in detail. The harmonic suppression factor is proposed, and the influences of system and transformer impedances on the harmonic suppression characteristic are revealed. Finally, the simulation and experimental case studies are used to verify the effectiveness of the proposed system on the comprehensive improvement of power quality and operating efficiency.