MT 26
International Conference on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: **1760** Type: **Poster Presentation**

Tue-Af-Po2.16-13 [27]: A new control strategy to improve the performance of the voltage source converter of new high power magnet power supply

Tuesday 24 September 2019 14:00 (2 hours)

In the past years, the thyristor converter technology has been adopted in the Tokamak coil power supply, mainly because of current carrying capacity and overload capability of thyristor with high power level. However, thyristor converter technology also has inherent defects, including poor dynamic control, low power factor, and producing a large number of reactive power and harmonics that damage to the power grid. With the development of semiconductor power device technology, the power level of full-controllable devices has been improved. Therefore, a new magnet power supply based on full-controllable devices is proposed. The new magnet power supply is composed of voltage source converter (VSC) and H-bridge. In this paper, a new control strategy is proposed to improve the performance of the voltage source converter. The new control strategy is to introduce the neutral point balance factor into the double closed-loop control system to achieve the DC side voltage stability and neutral point potential balance of the whole magnet power supply. Based on the theoretical analysis, the voltage source converter achieves the goal of high power factor and low harmonic operation while realizing the output target voltage and current, reduces the impact on the power grid, and improves the compatibility with the power grid. Finally, the theoretical analysis and the effectiveness of the control strategy are well-verified by Hardware-in-the-loop simulations on the RTLAB.

Author: Dr WANG, Zhenshang (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China)

Co-authors: Prof. FU, Peng (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China); Prof. HUANG, Liansheng (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China); Prof. CHEN, Xiaojiao (Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China;); Dr CHEN, Tao (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China); Dr WANG, Zhongma (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China); Dr DENG, Tianbai (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China); Dr TONG, Wei (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China)

Presenter: Dr WANG, Zhenshang (1.Institute of Plasma Physics, Chinese Academy of Sciences,Hefei 230031,P.R.China; 2.University of Science and Technology of China,Hefei 230026,P.R.China)

Session Classification: Tue-Af-Po2.16 - Power Supplies and Flux Pumps II: Transformers