Contribution ID: **1067** Type: **Poster**

5P66 - Reduction of the conducted disturbances generated by the ignition systems of GlidArc plasma reactors

Friday 28 June 2019 13:30 (1h 30m)

A plasma reactor with a gliding arc discharge is a source of electromagnetic interference both radiated and conducted. They affect the operation of the reactor power systems and devices controlling their operation. Disruptions in the reactor's operation can cause uncontrolled extinguishing and ignition of an electric discharge, which in the case of accumulation of flammable compounds in the reactor discharge chamber can lead to an explosion. When analysing the GlidArc plasma reactor in terms of electromagnetic interference emission, two sources of interference should be taken into account: the ignition system, generating an ionising discharge on the ignition electrode between the reactor's working electrodes, and the working electrodes system. Particular attention should be paid to the ignition system, which is often supplied from a separate circuit. The source of interference from the ignition system is a discharge that burns on the ignition electrode. Depending on the solution applied in the power system, the ignition electrode is supplied with a voltage from 10 kV to 15 kV and a frequency from 50 Hz to 20 kHz, with a current limit of 40 mA, while working electrodes are supplied with a voltage of up to 1.5 kV and a frequency of 50 Hz up to 200 Hz, with a current limit of up to 2 A. Through the working electrodes, interference from the ignition discharges is transferred to the current paths of the secondary side of the reactor's supply. The nature and levels of these disturbances were analysed for various solutions of the supply systems of working electrodes and the ignition electrode. Power supply systems for working electrodes with power converters proved to be particularly susceptible to damage. Reduction of disturbances can be obtained by selecting the parameters of the ignition system and by other solutions of this system.

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Session Classification: Poster - Compact and Explosive Pulsed Power and Pulsed Power Systems

Track Classification: 8.5 Power Supplies and Modulators