PPPS 2019



Contribution ID: 1257

Type: Poster

3P88 - Design and Analysis on Coil Parameter of Linear Rogowski Coil for Measurement of High Frequency Pulsed Current

Wednesday 26 June 2019 13:30 (1h 30m)

For miniaturization and higher frequency of electronic devices, a reliable technique for measurement of the high-frequency electric signals is required. A linear Rogowski coil based on a transmission line was proposed to measure the high-frequency pulse current by Nassisi and Delle Side (2017). The previous research showed that the linear Rogowski coil observed the pulse current with a rise time of 700 ps.

In our previous study, the equivalent circuit model of the linear Rogowski coil was designed by the transmission line (distributed circuit). The numerical simulation result on the equivalent circuit model confirmed the reflection of the current signal in comparison to the lamped circuit model. Also, we investigated numerically the effect on the coil parameters such as the stray capacitances and the resistance for the skin effect, in the characteristics of the linear Rogowski coil.

In this study, we discuss the design method of linear Rogowski coil. The numerical simulation model for the linear Rogowski coil were constructed based on the previous research. The equivalent circuit model of the linear Rogowski coil consists of four types of the coil parameters, which are the inductance, the resistance with the skin effect, the stray capacitance between the coil wires, and the stray capacitance between the coil and the shielding box. These four coil parameters affect the rise time and the waveform shape of the output current of the linear Rogowski coil. By analyzing the influence of coil parameter values on the measurement characteristics, we propose the design method of linear Rogowski coil.

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Session Classification: Poster - Industrial/Commercial/Medical Applications and Plasma and Pulse Power Diagnostics

Track Classification: 9.3 Pulsed Power Diagnostics