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5P59 - Energy Density Optimization of Inductive Pulsed Power Supply Module

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In an inductive pulsed power supply (IPPS) system, the energy density optimization of IPPS module is important for building a higher energy IPPS system. However, in the existing papers, the optimization of modules is rarely mentioned. This article uses meat grinder with SECT circuit as the background for module optimization. For the meat grinder with SECT circuit, the charging current and the energy are generally given, and the volumes of the thyristors and the counter-current capacitor that control the current are also fixed accordingly. In an IPPS module, there might be an optimal placement within thyristors and the counter-current capacitor. When designing the inductor, such an optimal placement, in addition to the constraint on the charging current and energy, puts forward a new constraint on the dimension of inductor (such as the outer diameter or the height). The optimized design of the inductor structure with certain constraint on the dimension is essentially the optimization for energy density of the entire module. In this paper, a 100kJ energy, 5kA charging current meat grinder with SECT module is taken as an example to realize the optimal design of the inductor under the dimension constraint, thus achieving the energy density optimization of the meat grinder with SECT module.

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