基于软 X 射线激发高压电源设计

中文摘要

自从 X 射线被伦琴发现以后，人们就开始把它应用到各个领域，特别是在检测与成像方面。其中软 X 射线具有波长范围宽，能量适中的特性，故软 X 射线具有穿透能力适中、对被检测物质伤害较低、成像效果好等特点。本论文针对软 X 射线的激发设计一种体积、纹波系数低的高压稳压电源。该高压稳压电源装置以市电作为输入，经过整流滤波、逆变单元、高频变压和倍压整流实现稳定的高压直流输出。逆变单元采用移相式零电压软开关全桥式逆变电路的拓扑方式，由 PWM 控制芯片控制其输出电流频率。倍压整流部分采用四倍正负双向倍压整流电路。

关键词：软 X 射线；高压稳压电源；纹波系数；零电压

Abstract

Since the discovery of x-rays by roentgen, they have been used in many fields, especially in detection and imaging. The soft X-ray has the characteristics of wide wavelength range and moderate energy, so the soft X-ray has the characteristics of moderate penetration, low damage to the detected substance and good imaging effect. In this paper, a high voltage stabilized power supply with low ripple coefficient and volume is designed for soft X-ray excitation. The high voltage stabilized power supply device takes the mains as the input and realizes the stable high voltage dc output through rectifying and filtering, inverting unit, high frequency transformer and double voltage rectifier. The inverter unit adopts topological mode of phase-shifting zero-voltage soft-switch full-bridge inverter circuit, and its output current frequency is controlled by PWM control chip. The double voltage rectifying part adopts four times plus and minus double voltage rectifying circuit.

Keywords: Soft X-ray; high voltage regulated power supply; ripple coefficient ; Zero voltage

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