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Development of a special power supply for the injector of compact X-ray source

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The invention relates to a special power supply for injection of a compact electronic storage ring and an injection method, belonging to the technical field of special power supply for particle accelerators. The power supply includes a DC power module, a switching power module, a high-frequency resonant capacitor and a control circuit. The invention adopts the series resonance scheme, drives the switching power module through the control circuit as the excitation of the resonant circuit, and the high frequency resonant capacitor and the load perturber form the LC resonant circuit. The resonant frequency can be adjusted by changing the capacitance of the capacitor. The H-bridge circuit composed of silicon carbide MOSFETs can excite resonance twice within one electron injection pulse width, effectively compensate the sine wave amplitude attenuation caused by circuit impedance, and effectively improve the injection efficiency. The invention makes use of the characteristics of the resonant circuit and combines multiple H-bridge circuits in parallel to realize the high-frequency sine wave high-power current source required by the compact electronic storage ring to inject the perturber, and solves the problem of low injection efficiency of the conventional injection method.

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Footnotes

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