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Analysis and improvement of a folded gigawatt intense electron-beam accelerators

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Long pulse intense electron-beam accelerators (IEBA) are of great interesting in many regions. In this paper, a folded IEBA is introduced. The pulse forming section of the IEBA is made up of two pulse forming lines (PFL) and a curving transition section to joint two PFLs together. This type of IEBA is compact in structure. The flat voltage of the main pulse on the load of IEBA is one of the important factors which affect the quality and characteristic of the output beam current of IEBA. Effect of the transition section on the output voltage of IEBA is analyzed in theory. A formula which is used to calculate the output voltage of IEBA is obtained. Wave impedance and transmission time of the transition section are major factors that influence the output pulse voltage waveform at the load. Experiments are performed on IEBA with different transition sections. The results show that to get flap top voltage at the load wave impedance of transition section should match the impedance of PFL. At the gas breakdown voltage of ~ 740 kV, a square shape pulse with voltage ~ 370 kV and pulse width 288 ns was obtained at the load. The experiments results are in good agreement with theoretical analysis.

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