

Nonsynchronous Electron Transportation in Traveling Wave of Linac,

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Down to the last time in all electron dynamics calculations influence of particles uncaptured in acceleration mode was neglected. Nevertheless, all experimenters know about such particles availability in energy spectrum at accelerator output, sometimes in quantity, considerably exceeding number of accelerated particles. The amount of such particles is determined not only by preliminary bunching conditions but different instabilities also. In this work the results of theoretical and experimental research of uncaptured electrons transportation in the traveling wave linac are given. It was determined, that such particles are focusing by the accelerating wave fields. This focusing can be strong enough to overcome the influence of transverse magnetic field. The calculations were made for a 50 keV electron beam transporting in a 10 cm wavelength traveling wave field with input power up to 10 MW propagating in accelerating structure of 4,4 m length based on the iris-loaded waveguide. The wave phase velocity in the structure is close to a speed of light. At the middle of this structure there was a 1 m length region with a 6 Gs intense transverse magnetic field. The experiments carried out have shown that no beam particles reach the structure exit if there is no microwave power in the waveguide. From the other hand, the presence of traveling wave in the structure allows the transportation of beam particles practically without any losses up to structure exit. It confirms a hypothesis of the focusing mechanism presence for nonsynchronous particles transportation in the traveling wave fields and necessity of their account. The comparison of theoretical and experimental results has shown a good concurrence, that testifies for the benefit of applicability of the developed theoretical methods for the account of this factor in linacs calculations.