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CORE OF THE INNOVATION

Magnetic systems based on rare-earth constant magnets for recirculating electron accelerators in the range of 10–100 MeV and systems for generating the radiation field of linear electron accelerators for applied purposes.

ADVANTAGES OF THE DEVELOPMENT

Usage of magnetic systems based on MPD (mode power distribution) allows obtaining qualitatively new structures of recirculating accelerators, in particular, split microtrons being notable for their compactness, simplicity of use, high repeatability and stable beam parameters.

Usage of MPD in the structures of magnetic systems for generation of the radiation field of linear accelerators allows creating new technologies for irradiation of the product with greater homogeneity and absence of high-pulse radiation loads.

ВНЕДРЕНИЕ РАЗРАБОТКИ

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PEOPLE

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Product features

1

The development allows creating compact recirculating accelerators in the range from 10 to 100 MeV that are easy to use, generate large-sized homogenous radiation fields in beam output systems of process electron accelerators in the range from 1 to 10 MeV. These magnetic systems can be located in vacuum.

2

The problem is solved by detailed three-dimensional simulation of magnetic systems, by development of their construction ensuring the assembly without using adhesive materials, by development of the procedure for automated high-precision measurement of the field characteristics in the planes of symmetry as well as control of the symmetry of field distribution in respect to these planes.

3

The design of magnetic systems includes the field setup elements allowing to achieve the required characteristics with high precision without dismantling the system and without using technique of re-magnetisation of MPD elements.

Relevance of the development

1

At the present time there are about 30 thousand accelerators of charged particles are operated daily in the world, e.g. in clinics, at factories, sterilization stations, at ports, at customs terminals, etc. The market of medical and industrial accelerators for 2010 has exceeded 3.5 billion US dollars a year and grew each year more than by 10%.

2

The full price of the products being treated by beams of charged particles annually exceeds 500 billion US dollars. In doing so, new systems for generation of the radiation field can be proposed for a considerable part of these accelerators.

3

The relevance of using such magnetic systems results from the tendency of fast development of radiation technologies, which implementation requires electron accelerators having high economic efficiency, high reliability, being simpler in operation, having smaller weight and dimensional characteristics, lower price, generating particles beams and fields of radiation with new properties.

4

At the present time the manufacture and setup of magnetic systems of a small-sized accelerator in the range of 12 MeV is under way for intraoperational irradiation of malignant tumours during operations as well as system for generation of the field of radiation of process accelerators for the energy of 1 MeV and 10 MeV.