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Development and Application of Electron Linear Accelerator of CIAE

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As an artificial radiation source, electron linear accelerator is not only widely used in basic science research, but also more and more used in industry, agriculture, medical and environmental protection and other fields. China Institute of Atomic Energy (CIAE) began to engage in research and development of electron linear accelerator from its early establishment, and has converted the research outcomes successfully into products and services in the cause of China's prosperously development.

These outcomes are mainly divided into two categories. The first category is the Non-Destructive Testing (NDT) electron linear accelerator (LINAC). In the 1990s, CIAE successfully developed China's first NDT electron LINAC, then successively developed a series of accelerator products with different X-ray beam energy like 2MeV, 4MeV, 6MeV, 9MeV, the detection thickness of equivalent steel reach to 380 mm, mainly used in the detections of weld joints of thick-walled pressure vessels, pipes, boilers, valves equipped in petrochemical industry, thermal power plant and nuclear power plant, testing of the defect of key components of the high-speed train, rocket engine and so on. The national standards of NDT electron LINAC was drafted by CIAE and the corresponding international standard project launched to International Electro-technical Commission (IEC) from CIAE has been started and is progressing well; The second category is electron LINAC for radiation processing. The first radiation facility based on high-power high-energy electron LINAC developed by CIAE was put into trial operation in 2007. The Electron Beam (EB) energy of this accelerator is 10MeV, and the power exceeded 15kW, which was the highest power of the same type around that time. Currently, the EB power of this type has reached 20KW, and was capable of stable operation. Number of radiation processing enterprises has purchase this type of accelerators, which are used for garlic, tea preservation and pet food, seasoning sterilization.

In China, R&D direction of NDT electron LINAC is miniaturization and digitalization, while for irradiation accelerators, scientists and engineers are striving to improve the EB power or X-ray conversion efficiency.

Country/Organization invited to participate

China

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