# OPTIMIZATION AND MANUFACTURING OF ACCELERATING STRUCTURE OF THE LINEAR ELECTRON ACCELERATOR FOR APPLIED RESEARCH

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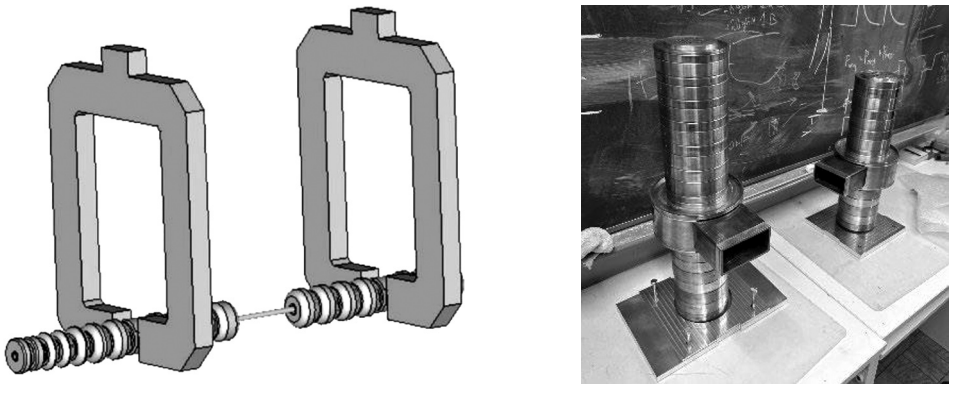
The report describes the process of optimization and manufacturing of the two-section accelerating structure for the 8 MeV linear accelerator. The design characteristics and theoretical dependencies of electrodynamic parameters on geometric parameters of RF-components are obtained. The values of these characteristics for the manufactured structure are measured.

Linear electron accelerators are commonly used in both fundamental and applied scientific research, as well as for various industrial and medical applications such as radiation therapy [1–2], gamma activation analysis [3] and sterilization of medical products [4]. The study of radiation resistance of the electronic component base is one of the priority areas of accelerator application. The team of NRNU MEPhI [5] designed such a facility based on the previous experience of creating standing wave linacs with a biperiodic accelerating structure. The beam dynamics and electrodynamic characteristics of the accelerating structure were calculated (Fig. 1, a). The dependences of the electrodynamic characteristics on the geometric parameters of the calculation model were studied before the start of manufacturing.

Two sections were produced, consisting of 12 and 8 cells, as well as matching diaphragms and part of the waveguide tract. At each stage of processing measurements of frequency and quality factor were carried out using a vector analyzer of circuits on mock-ups of two half-cells similar to the calculation models. This approach, including two-stage control of electrodynamic characteristics (calculated dependences and direct measurements), made it possible to obtain a structure with a high degree of correspondence between the calculated and experimental values of the parameters. Repeated measurements of electrodynamic characteristics, carried out at the National Research Nuclear University MEPhI, confirmed the previously obtained results.



*a* *b*

Fig. 1. Calculation model of the accelerating structure (*a*). Manufactured sections of the linear electron accelerator before conducting a repeated series of measurements (*b*)

## References

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