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Research on a Hybrid Coupled Cavity Accelerating Structure for Low-Energy High-Current Proton Beams

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To enhance the accelerating efficiency of the high-current accelerator for a neutron source, a 100-mA, 162.5-MHz, CW compact hybrid accelerating cavity incorporating inductively coupled four-vane RFQ and CH DTL structures is designed. The dynamics design, the RF structure design, and water-cooling design of the hybrid cavity have been accomplished. The proton beam is accelerated from 80 keV to 0.8 MeV via the RFQ and is further accelerated to 3 MeV by the DTL. The coupling modes of the two-resonant-cavity are analyzed with the circuit model. A resonant frequency and field distribution matching scheme based on local frequency adjustments of both the RFQ and DTL sections are presented. The designed length of the hybrid accelerating cavity is 3.94 m, and its total power consumption is 101.3 kW.

Footnotes

Funding Agency

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Yes

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