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Design and optimization of water-cooling scheme for a 162.5 MHz three-gap rebuncher cavity

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To realize the matching of RFQ and DTL, it is expected to place a three-gap rebuncher cavity with a frequency of 162.5 MHz in the MEBT section. The dynamics design parameters of the cavity have been determined, so this paper mainly focuses on the RF design and multi-physics field analysis of the cavity. Modeled in CST, the normal temperature CH-type structure is selected, in order to increase the Q value and reduce the power consumption of the cavity, the parameters such as the radius of the stems, the outer radius of the drift tube, and the length of the drift tube at both ends can be reasonably optimized. Determine the RF parameters and then carry out multi-physics analysis, the most important of which is how to reasonably arrange the water cooling layout so as to reduce the temperature rise of the cavity, in this paper, the water pipe in the end plates finally adopts the 'L' type distribution. After simulation, the deformation and frequency shift of the cavity are within the acceptable range.

Footnotes

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