DESIGN FOR SPLIT-COAXIAL STRUCTURE

Yuko Katayama, Yasuo Ikeda and Hidekuni Takekoshi

Institute for Chemical Research, Kyoto University

Anstruct

A rf model of the split-pole RFQ structure was made and resonant frequencies and rf quadrupole field distribution were measured. Also a RFQ buncher for proton was constructed and rf test of higher power level is going on.

Introduction

RFQ structure which was succesfully tested at Los Alamos[1] consists of of four vanes. For the fabrication of this structure, however, machinning of the vanes and assembling of the RFQ cavity is not an easy task. While the split coaxial RFQ structure[2] which was proposed by Frankfurt University is a rather simple configulation. It consists of four modulated circular rods and fabrication seems to be more easier. We investigated another configulation of the split coaxial RFQ structure from a viewpoint of easiness of mechanical fabrication.

Structure and construction

The modulated circular rods structure[2] is shown in Fig. 1. An different configulation that consists of woven circular rods is shown in Fig. 2. A copper tube could be woven rather easily when a proper die should be used. Pole-tip parts of vanes of the

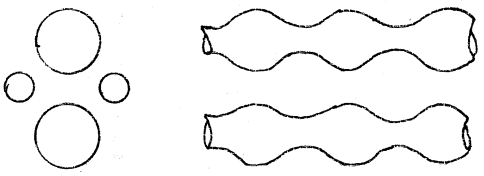


Fig.1 Modulated circular rods.

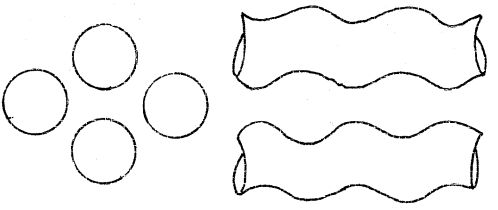


Fig.2 Woven circular rods.

Los Alamos RFQ structure, which is shown in Fig. 3, can be adapted to the split coaxial RFQ structure. In the case of low energy economical accelerators, which is used for example for implantation of impurity in semicaonductor material and for PIXE experiments, a simplefied configulation may be used.Fig. 4 shows

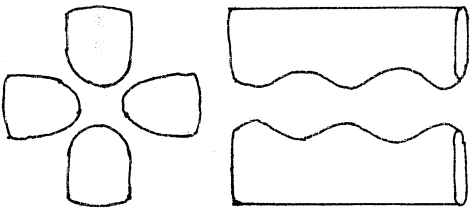


Fig.3 Tip of vanes structure.

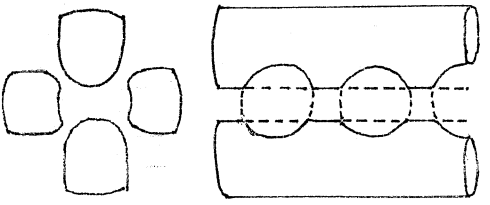
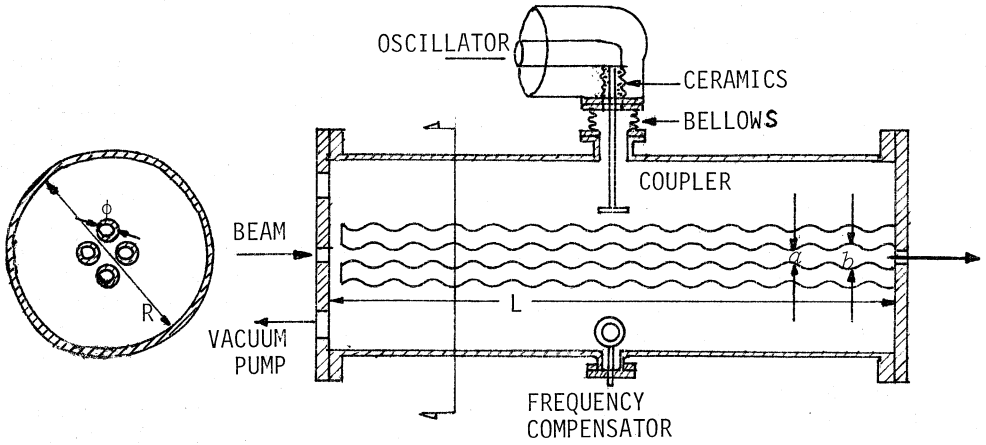


Fig.4 Bored plates.

this configulation. On a flat plate holes are bored in a row by drilling and subsequently the plate is cut and carved along the row symmetrically. Finally the edge of plates is rounded by a milling machine. However about this structure carefull beam dynamic study should be made.

RFQ buncher test

A rf model of the split-pole RFQ was mad and resonant frequencies and rf quadrupole field distributions were measured.[3] Also a RFQ buncher for 20 keV protons was constructed. Dimensions and main parameters of the cavity are shown in Fig. 5. Compered to a diameter of the coaxial dipole cavity, a smaller diameter can be used. Because in the cavity the quadrupole field decays radially much faster than the dipole field. Rf test of higher level is going on.



INJECTION	:	20 kV PROTON
ION VELOCITY:		β=0.0067
RF FREQUENCY:		100 MHz
$\beta\lambda$	:	20 mm
CAVITY	:	R=107 mm, L=300 mm
ELECTRODE	:	ϕ=12 mm, a=7 mm, b=13 mm

Fig.5 RFQ bumcher for 20 keV protons

References

1) Compiled by L. D. Hansborough LA-8880 (1982).

2) P. Junior, et al., Proc. 1981 Linear Accel. Conf., Santa Fe, p. 81 (1981).
H. Klein, et al., Proc. 1981 Linear Accel. Conf., Santa Fe, p. 96 (1981).

3) Y. Katayama, H. Takekoshi, Proc. 1982 Linear Accel. Conf. in Japan, Tsukuba, (1982).