

PRELIMINARY STUDY OF BEAM BLOW-UP IN THE TOKYO LINAC

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Preliminary measurement of the frequency of beam blow-up in the Tokyo linac (ML-35L) is described. It seems that beam blow-up took place at about 3982 MHz beyond the peak current of 280 mA.

Introduction

Tokyo linac consists of two 1.8 meter long accelerating structures and a subharmonics buncher. Each loading disk of the accelerating structures has two suppressor holes in addition to center hole and is assembled alternately for prevent HEM₁₁ mode from propagation¹⁾. It has been considered that this structure is effective to suppress the beam blow-up derived from HEM₁₁ mode. Beyond the peak current of 280 mA at 4.4 μs beam width, the beam blow-up phenomenon was observed and we were motivated to measure the frequency of this beam blow-up.

Measurement

Measurement of this were carried out in a same way as the Tohoku linac²⁾. We found two pairs of frequencies ($f_a = 4586$, $f_b = 3982$ MHz) and ($f'_a = 4548$, $f'_b = 4020$ MHz) lower than 4.6 MHz. The former was strong and the latter was weak. The sums of frequencies were same and equal to $3f_0$, where f_0 means accelerating frequency 2856 MHz. These pairs were accompanied with beam blow-up, therefore f_a or f_b is considered as the frequency of beam blow-up then remainder must be the beat ($3f_0 - f_{bbu}$). On the assumption that $f_a = f_{bbu}$, f_b and f_c in fig.1 correspond to $2f_{bbu} - f_0 = 5108$ MHz and $f_{bbu} + f_0 = 6838$ MHz respectively and f_c corresponds to $2f_{bbu} = 7964$ MHz. On the other hand, the assumption that $f_a = f_{bbu}$ has failed to make clear the origins of f_a , f_b and f_c . Hence we conclude that beam blow-up took place at 3982 MHz. According reference 1), the pass-band of HEM₁₁ mode for this kind of accelerating structure was found between 4340 and 4490 MHz by the test cavities. We doubt whether the dispersion curve for HEM₁₁ mode of the test cavities was equal to one of the practical accelerating structure.

References

- 1) K. Irie, Y. Nemoto, I. Uetomi and Y. Minowa : Mitsubishi Denki Laboratory reports, 9 (1968) 197.
- 2) M.Oyamada et al., : paper presented at this conference.

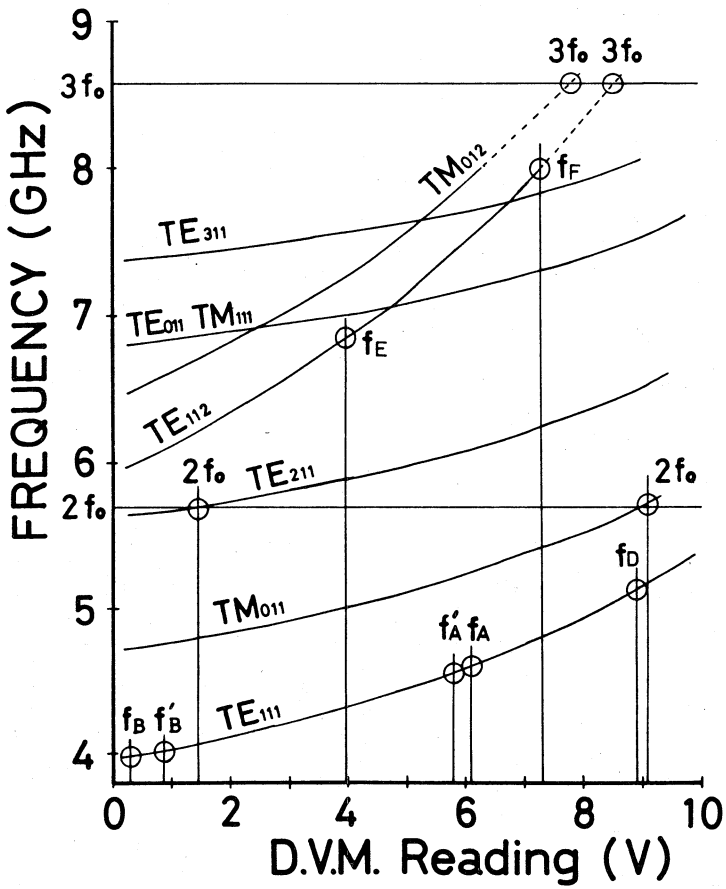


Fig.1 Frequencies corresponded to the peaks