ACCELERATION CHARACTERS OF THE PF 2.5 GeV LINAC

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Summary

This paper reviews the beam parameters in a recent operation, and a measurement results of beam blow-up phenomena.

1. Energy gain and Energy Spread

The basic parameters of the PF 2.5 GeV Linac and the details of the accelerator structure are described in ohter papers[1,3~7] The cold measurement for accelerator guides indicates that each frequency of $2/3\pi$ phase shift in the accelerator guides has a little deviation from the design frequency (2856 MHz) as shown in Fig. 1. The deviation causes a reduction of energy gain and an expansion of energy spread. However, as a result of the operational measurement, it is shown that the reduction and the expansion are small in Fig. 2.

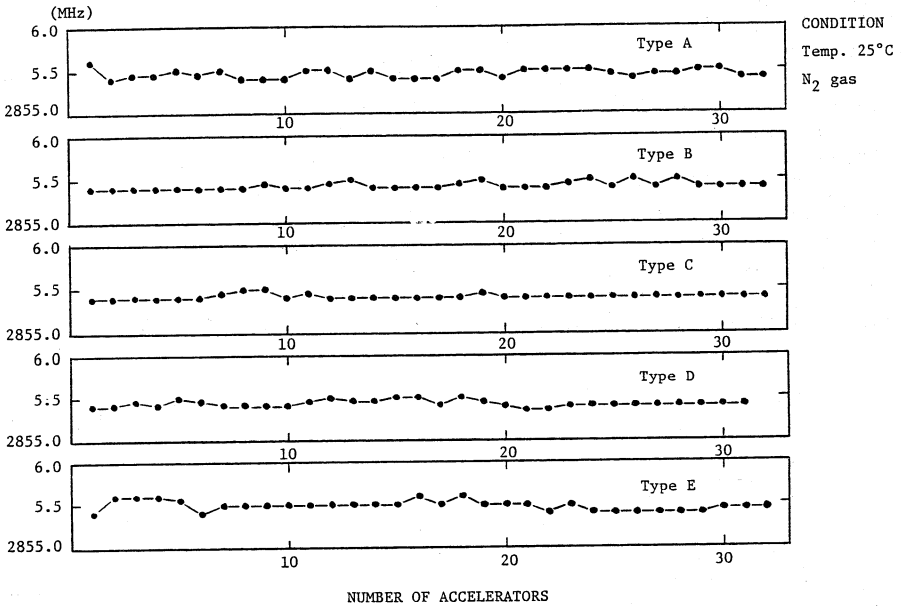

Fig.] The optimum frequency of the $2\pi/3$ phase shift in the accelerator guides.

2. Transmission Rate in the Beam Transport System

The structure and parameters of the beam transport system is described in the other reports[2,8] The betatron orbit in the focusing system is usually operated with a $\pi/4$ phase shift between quadrupole triplets and the beam transmission from the first sector to the end sector is nearly 100% in the rate. In recent, the $\pi/2$ phase shift operation was tried and achieved a good transmission rate of about 100% in this system. Figure 3 shows the measured

beam current along the beam transport.[9]

3. Beam Blow-up

The beam blow-up (BBU) phenomena occur when the beam current is increased above a threshold value at the end of the accelerator as shown in Fig. 4. The observation appeared at 300 mA with a pulse width of 1.6 μsec. This threshold is twice as large as SLAC data at the same energy and pulse width.[10,11]

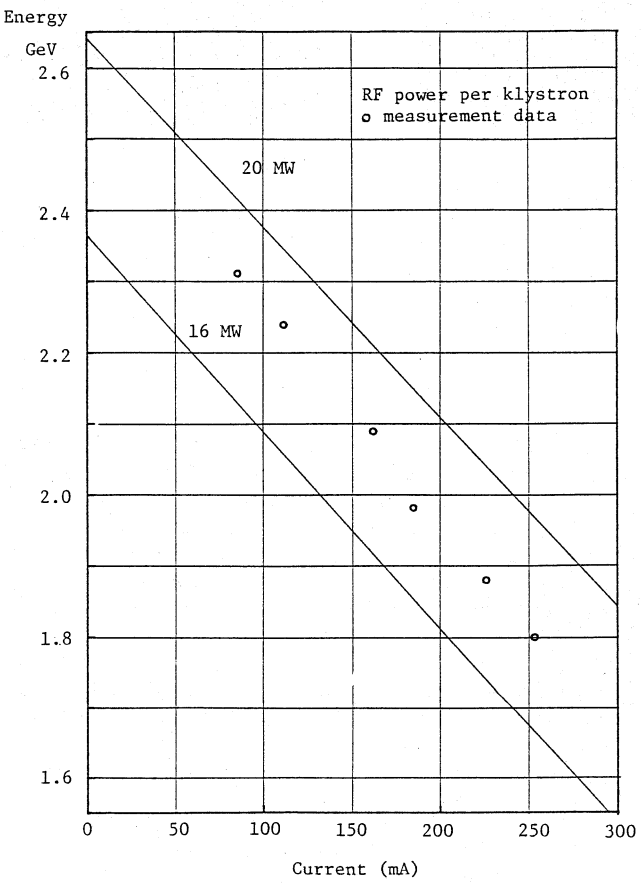

Fig.2 Beam current vs energy for input power.

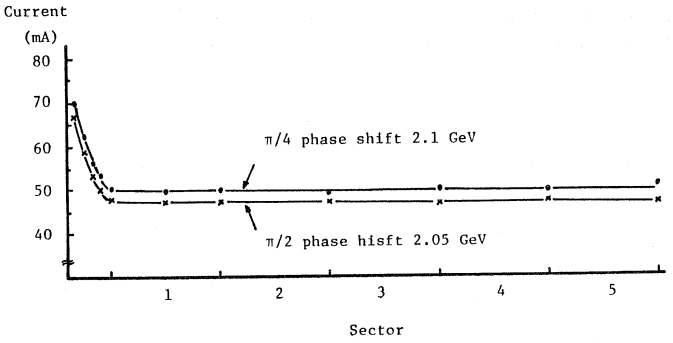

Fig.3 Output of beam monitors along beam line.

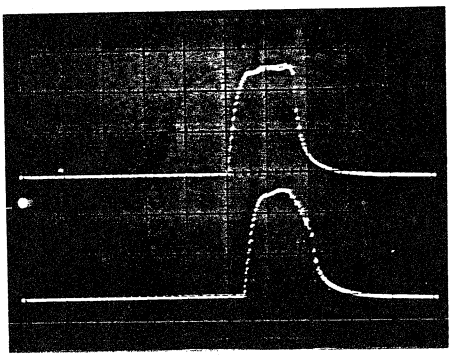

Fig.4(a)
Upper: Pulse shape of current monitor (CM-5-0) installed at head of Sector 5. (∿300 mA)
Lower: Pulse shape of current monitor (CM ECS1) installed in the 3 switch yard.

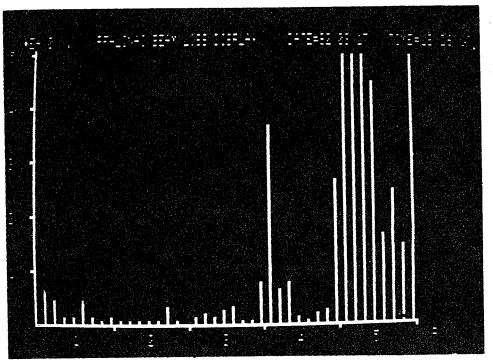

Fig.4(b)
Output of beam loss monitor located along beam line from Sector 1 to Sector 5.

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