

## **Simulations of Ultra Short Single Bunch Operation on 150 MeV Microtron, T. HORI, M. WASHIO, J. YANG, SUMITOMO-HEAVY-IND. -**

In order to generate femtosecond X-rays by inverse Compton scattering, it is inevitable to produce ultra-short pulses for both laser and electron beams. One candidate to obtain such the ultra-short electron pulses is a racetrack microtron (RTM) because of its outstanding beam characteristics, that is, low emittance of the order of 0.1 pi-mm.mrad and small energy spread of 0.1% in the case of our 150 MeV RTM [1]. The design of RTM has been established after several machines recorded a fine performance as the 150 MeV injectors of compact SR rings, AURORA-1 and -2's. The already-existing design is, however, optimized for the output beam having medium pulse length at about a few microseconds and relatively low peak current, 10 mA at the maximum. This means that we have been using RTM not under the transient condition but under the steady state. We need to investigate, therefore, the RTM's behaviour on transient when considering the acceleration of a single bunch shorter than one period of RF (S-band). We first simulate a single-bunched electron beam how it could preserve the synchronous condition required from the principles of RTM. The space charge effects while acceleration would next be taken into account.

- [1] T. Hori, et al., "Output Beam Characteristics of 150 MeV Microtron", submitted to PAC'97 (Vancouver, Canada, May 12-16, 1997).