

Beam Loading Issues and Requirements for the KEKB Crab RF System, K. AKAI and Y. FUNAKOSHI, KEK - The crab crossing is considered a viable solution to the problems encountered with the finite angle crossing scheme in KEKB. The R&D of a single cell superconducting crab cavity is in progress at KEK. This paper describes beam loading on the crab cavity operated in a dipole mode, coupled-bunch instability caused by the crabbing mode itself, and tolerances for errors. It also gives a set of RF parameters and possible operation schemes to satisfy the requirements. Some of the results obtained are; (1) The loaded-Q value should be reduced to 10^6 to avoid extreme sensitivity to a beam orbit change or mechanical vibration. An RF source of 50 kW is then required for each cavity. (2) With the KEKB parameters, the growth rate of the coupled bunch instability caused by the crabbing mode is in most cases smaller than the radiation damping rate both transversely and longitudinally. (3) It is desired to control the phase of the crabbing mode and the beam orbit in the crab cavity with an accuracy of about 1 degree and 0.1 mm, respectively.