

Modelling of Low Frequency Longitudinal Coupled Bunch Oscillation, R. NAGAOKA and A. WRULICH,

Sincrotrone Trieste - A notable beam instability observed in ELETTRA under a strong influence of the RF cavity HOMs exciting the longitudinal coupled-bunch motion is a coherent oscillation in the frequency range below 100 Hz. Upon a series of measurements and analysis, the phenomenon is interpreted to be a coherent synchrotron motion growing rapidly until the amplitude reaches the Landau damping regime due to the increased nonlinearity. The blown up beam will then be subject to radiation damping until it recovers the coherence again. To verify the obtained model, studies have been made by performing a longitudinal multi-particle tracking where the effects of the cavity wake field, the nonlinear synchrotron force and radiation damping are taken into account. The involved parameters are swept around their expected values to investigate their role on the dynamics thereby attempting to reproduce the observed phenomena. It is found, in particular, to be essential to assume a large dependence of the coherent growth rate on the particle distribution which varies drastically in time. A comparison with the measured data are also presented.