

Experimental and Theoretical Studies of Transverse Single Bunch Instabilities at ESRF,
G. BESNIER, Univ. of Rennes; J. JACOB,
P. KERNEL, R. NAGAOKA, J.-L. REVOL,
A. ROPERT, ESRF - At the ESRF, the transverse instability threshold which limits the maximum intensity per bunch is pushed by increasing the vertical chromaticity to large positive values. To overcome the induced reduction in lifetime, a feedback has been developed, but it is less effective than the chromaticity overcompensation. With the increased impedance resulting from the installation of low gap vacuum chambers, the accumulation of high single bunch current becomes increasingly difficult. To understand the underlying physics and thereby to explore better settings, the transverse single bunch effects are being thoroughly investigated experimentally as a function of the involved parameters such as chromaticity, beam current, bunch length. In parallel, a comprehensive theoretical description of the transverse single bunch instabilities observed at the ESRF is attempted with the development of a multiparticle tracking code. In both approaches, the influence of the chromaticity on the merging of the head-tail modes and the impact of the beam spectrum shift with chromaticity and bunch lengthening are studied. The performance of the feedback for different settings of the machine is also evaluated.