

Dynamic Aperture and Resonance Compensation in the Luminosity Upgraded HERA-e Lattice,
T. SEN, DESY - The electron emittance will be reduced in the luminosity upgrade by increasing the horizontal focusing in the arcs. Consequently the sextupole strengths will nearly double to compensate the larger chromaticity. The dynamic aperture of the new lattice in the presence of orbit errors has been calculated with and without the effects of radiation damping and quantum fluctuations. Under the same conditions, the dynamic aperture is nearly halved compared to the value for the lattice now operational. This agrees with an approximate scaling law for the dependence of the dynamic aperture on the sextupole strength. While the detuning with amplitude terms are large, specially the cross-detuning term, we find that the dynamic aperture does not depend sensitively on them. However the dynamic aperture does change significantly as the strengths of the third integer coupling resonances are varied. Sextupoles placed in the dispersion free west straight sections can compensate for these resonances and their effect on the dynamic aperture is discussed. We also find that synchro-betatron resonances affect the off-momentum aperture significantly. Compared to a lattice with a single RF cavity, the realistic lattice with distributed RF cavities has a better off-momentum dynamic aperture.