Impedance meeting  
8 December 2017

Presents: D.Amorim (DA), S.Antipov (SAnt), O.Berrig (OB), N.Biancacci (NB), A.Gilardi (AGil), F.Giordano (FG), S.Hirlander (SH), L.Huang (LH), R.Illàn Fiastre (RIF), G.Mazzacano (GM), E.Métral (EM), A.Oeftiger (AO), A.Passarelli (AP), L.Teofili (LT), D.Ventura (DV).

The slides can be found at https://indico.cern.ch/event/686784/.

Closed form expressions for indirect transverse space charge field effects in circular accelerators with applications to PS and LHC (SH)

Simon Hirlander presented a new model to compute the incoherent tune-shift for different machines. The results from the old model were outside the measurements error bars. The new closed form and numeric models are much closer.

The complex geometry of accelerator magnets can be taken into account such as in the case of the PS and its combined functions magnets (see slide 18). Slide 32 shows some results for the PS, the baseline takes the complex geometry of the magnets into account. It is compared to the smooth approximation and to the strip model (parallel plates).

OB asked if other materials can be used in the model. SH answered that PEC material is assumed but other materials could be added with some modifications.

In summary, these closed form expressions allow for fast calculations. The method is also more stable: for example the FEM code Roxie fails near boundaries, which is not the case with the closed form expressions.

Proposal for a new formula to calculate beam impedance for 2D structures in the classical thick wall regime (OB)

Olav Berrig presented the simulations of a structure with reduced dipolar impedance. This structure was checked with CST. It was also computed analytically from the current density over the surface and Ampere’s law.

EM remarked that in slide 5 both the source and test particles are displaced. In consequence the wake potential showed is the sum of dipolar and quadrupolar components. OB answered that the quadrupolar part should be zero, to be showed in the future.

Resistivity measurements on Molybdenum coated CFC and MoGr blocks (GM)

Giacomo Mazzacano presented the results of resistivity measurements on different coated CFC and MoGr blocks. The measurement is performed with a RLC meter.

On the coating side, the measured resistivity seems constant for a large range of frequencies which is not reproduced in the simulations (slide 6, top plots). However the block treatment (either CO₂ blasting or polishing) doesn’t seem to affect the impedance.

The thermal treatment (900 °C during 48 hours) affects the impedance (see slide 9). NB pointed that a 10% increase is acceptable but this resistivity check should be made
more often and with more samples. If there is a factor 2 on the impedance for some batches, this could become a problem.

SAnt pointed that the resistivity in our models should be updated to take into account these possibly increased resistivity. EM added that using a 8\( \mu \text{m} \) coating instead of a 5\( \mu \text{m} \) one could increase the tune-shift by 50%.

NB added that they will ask W.Vollenberg to provide a ceramic sample coated on one face to measure only the coating resistivity.

*Minutes written by: D. Amorim*