

SIMULATION OF COHERENT DIFFRACTION RADIATION GENERATION BY PICO-SECOND ELECTRON BUNCHES IN AN OPEN RESONATOR

*Leonid Sukhikh^a, Alexander Potylitsyn^a, Dan Verigin^{a,1},
Konstantin Artyomov^{a,b}*

^a National Research Tomsk Polytechnic University, Tomsk, Russia

^b Institute of High Current Electronics SB RAS, Tomsk, Russia

We have studied theoretically the process of generation and accumulation of coherent diffraction radiation (CDR) produced by short electron bunches in open resonator at LUCX facility of ATF KEK. In contrast with conventional applications of resonators for FELs in our case radiation is generated by electron bunches passing through vacuum holes in both mirrors (1,2).

In this report we compare CDR characteristics in resonator obtained by a) numerical simulation using PIC code KARAT, b) Laguerre-Gaussian modes of resonator and c) simulation of generation and propagation of CDR in an entrance and an exit mirrors using generalized surface current method. Two schemes, namely semi-confocal with mirror radius of curvature 840 mm which was used in experiment (2) and confocal one were investigated. Losses and Q-factor of resonator were calculated. By these results geometric and diffraction losses of CDR in the resonator were calculated and new scheme of experiment was proposed to achieve Q-factor much higher than measured in the experiment (2).

The work was partially supported by the Russian Ministry of Education and Science within the program “Nauka” Grant No. 3.709.2014/K

References

- [1] A.Aryshev and et al, in: Proc. IPAC-10, Kyoto, Japan, 2010, MOPEA053
- [2] A.Aryshev, and et al, NIM A, v. **763**, pp 424-432 (2014)

¹ Corresponding author: verigin@tpu.ru