

Topic H3. Wave interaction and wave-particle interaction.

**NOISE RADIATION OF ELECTRON FLOW INTERACTING WITH
UNDULATOR SYSTEM ELECTROMAGNETIC FIELDS**

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The experimental results of focusing and transport of electron beam through Motz undulator with small kinetic energy are presented in this paper. It is shown that a use of external leading magnetic field improves inlet conditions in the system and has an influence on spontaneous radiation intensity. Resonance scattering of space charge waves on periodical inhomogeneities of electron beam formed by undulator static magnetic field was obtained in regimes of great current values. A question of possibility of influence of Cerenkov radiation mechanism on undulator system resonance radiation was discussed.

Development of theoretical and experimental researches of physical processes of FEL forms new direction – laser physics and allow physicists to create tunable in a wide wave range, new class of powerful relativistic devices based on stimulated radiation. However we can notice a tendency of carrying out experiments in a region of small energies of electrons and electron flows of high density, and also degree of wave participation in scattering operations on electrons in cyclotron and Cerenkov interaction regimes in undulator space [2],[11-12]. This work is directed on a solving of task in high current density regimes and small accelerating voltages of electron beam (electron velocity is about 0,1 - 0,3 of light velocity). For observation of resonance effects of density wave scattering of electron flow moving in crossed H-fields the model of Motz undulator was made. It was linear chain of constant dipole magnets fabricated from materials inter-metallic material $Sm^{2}Fe_{5}$. Accelerating voltage of electron diode gun was varied up to 6 kV, beam current did not exceed 100 mA. Space amplitude of electron flow motion was operated by ratio $H_{\perp} / H_{\parallel}$. In fig.1 typical photo of projection of a beam moving in undulator space is shown. Spontaneous radiation of electron flow was received by dipole antenna of cm-range and registered by receiving apparatus.

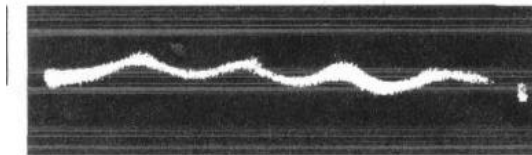


Fig.1. The photograph of electron flow motion trajectory.

In accelerating voltage range up to 6 kV several microwave resonances were observed on oscillograph. They appear as strong increase (in 10-50 times) of noise signal amplitude relatively to non resonance case. One of possible variant of resonance radiation excitation explanation by means of synchronization mechanism of electron flow density waves with slow harmonics of undulator periodic structure was considered.