

RESUMO N° 38

## **THE COMPUTATION DYNAMICS OF ELECTROMAGNETIC RADIATION IN 3D DISPERSIVE METAMATERIALS.**

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We numerically investigated the complex dynamics of the electromagnetic radiation generated by the charged particles crossing 3D dispersive nano metamaterials. In our theory only parameters of a medium are fixed, while the frequency spectrum of the internal excitations is left to be defined as a result of numerical calculations. Accurate numerical simulations (with the use of 3D Drude model) show that the periodic field structure coupled to plasmonic excitations is arisen when the dispersive refractive index of such a system becomes negative. In this case the reversed Cherenkov radiation can be observed. The specific resonant field interferences in the frequency range with the negative refractive index of a metamaterial is registered. The results of numerical simulations show that the frequency spectra (resonances) of the plasmonic excitations are formed due to the nonlinear fields interplay in the frequency domain. The application of the parallel schemes for numerical simulations in such a coupled problem is also discussed.