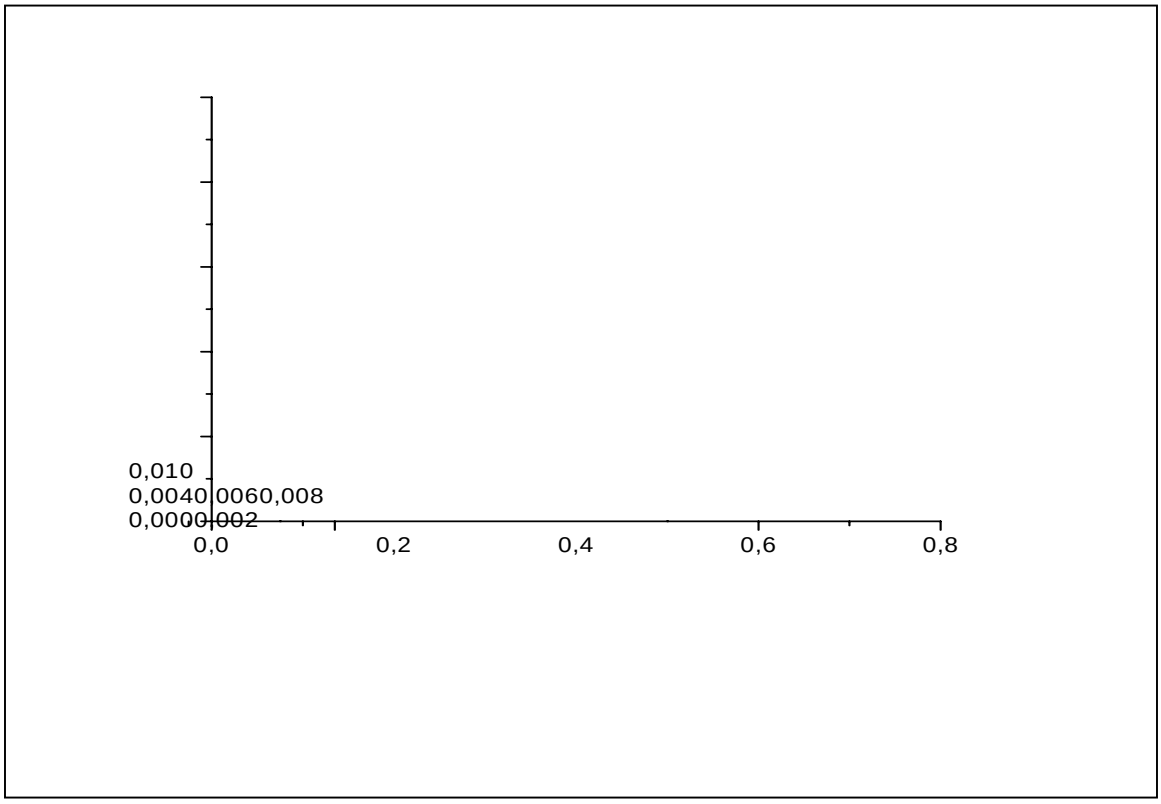
The progress in laser-plasma accelerators depends substantially on the possibility to provide extended quasi-monoenergetic acceleration of short electron bunches. The inhomogeneity of a comparatively short-wavelength laser wakefield tends to increase the energy spread of finite length electron bunches [1], but at the same time it is responsible for the effects of

The effect of finite beam radius to the bunch compression is shown in Fig. 3. The results of tree-dimensional test particle simulations are in a good agreement with a simple analytical prediction of Eq. (3) for the initial bunch radiuses less than plasma skin depth $1/k_p = \lambda_p/2\pi$. The energy of accelerated bunch doesn't depend on its radius and for discussed example reaches 3 Gev as is shown in Fig. 4.



An ability of the proposed scheme to provide a highly monoenergetic acceleration of compressed electron bunches is demonstrated in Fig. 5. While the energy spread increases substantially during the bunch compression (a peak in Fig. 5 corresponding to the bunch trapping

REFERENCES

[1] N.E. Andreev, S.V. Kuznetsov, I.V. Pogorelsky, “Monochromatic laser wakefield acceleration”, *Phys. Rev. Special Topics-Accelerators and beams*, vol. **3**