

Methods of Ion Focusing and Acceleration in RF-Fields Containing Nonsynchronous Harmonics,
E.S. MASUNOV, N.E. VINOGRADOV, MEPHI - In a normal RF linac ion beams are accelerated by a synchronous harmonics of RF field. Nonsynchronous harmonic can be focusing the ions only. The other methods of the ion accelerating in RF-fields without synchronous harmonic are suggested in this paper. These methods can be realized either in a special periodical RF structure or in a uniform structure where periodical undulators are used. The investigation of the ion beam dynamics in the fields of nonsynchronous harmonics is executed by averaging method. The expression for three-dimensional effective potential is obtained. The study of a longitudinal and a transverse dynamics is carried out by means of this potential. The amplitudes and phases of nonsynchronous harmonics define the shape and depth of the effective potential well for which the simultaneous focusing and acceleration of the particles are realized. The analysis of the potential well allows to find optimum conditions to achieve both large longitudinal acceptance and transverse focusing. The influence of coupling resonances on the choice of field amplitudes is studied. The results are compared with beam dynamics for traditional linear accelerator.