Controlling Beam Halo-Chaos by Adaptive Control Exterior Magnetic Field

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Abstract: In this paper, the parametric adaptive method for controlling the beam halo-chaos in the periodic focusing channels of high-current proton linacs is presented. The study of proton beam halo-chaos based on controlled beam envelope equation and the results of particles-in-cell simulations for macro-particle beam show that the proton beam chaotic envelope as well as the beam rsm radius can be controlled to the beam matched radius using this method. For the Kapchinskij-Vladimirskij (K-V) distribution of initial proton beam, all statistical physical quantities of the beam halo-chaos are largely reduced. This control method has an advantage of the control halo-chaos since the exterior magnetic field as controlled parameter can be rather easily adjusted in the periodical magnetic focusing channels for the experiment.

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