

Inverse inference of initial beam profile and key parameters based on automatic differentiation method

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For experiments requiring the longitudinal shaping of the beam at the exit of an electron linear accelerators, it is crucial to infer the initial beam profile at the entrance of the linear accelerator and key parameters. After passing through the dispersion section of beam bunch compressor, and the high-frequency system, the electron beam will undergo modulation on the longitudinal density. Based on the longitudinal dynamic process, this paper proposes to use automatic differentiation to provide the design of beam initial conditions and key parameters corresponding to a specific longitudinal profile of the beam at the exit of the linear accelerator. Finally, we implemented this method on a section of linear accelerator consisting of two L-band accelerating cavities, one S-band accelerating cavity, and a bunch compressor.

Footnotes

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