



Contribution ID: 2568 Contribution code: THOGB3

Type: Contributed Oral Presentation

A Study on Differentiable Space Charge Model Based on the Green's Function Solver

Thursday, 11 May 2023 12:10 (20 minutes)

Gradient-free algorithms are commonly used because of the lack of knowledge about the derivative of the beam properties with respect to the accelerator parameters while running accelerator optimization simulations. However, similar to the automatic differentiation algorithms widely used in the AI/ML community, recent efforts have been made in the accelerator community to develop differentiable simulation models. In particular, differentiable space charge simulations benefit because computation time is usually critical in beam dynamics simulations. Recently, automatic differentiation of space charge simulations using truncated power series algebra (TPSA) has been proposed and shows its potential. In this study, we developed a differentiable self-consistent spatial charge model based on Green's function solver using the Hockney-Eastwood and Vico-Greengard-Ferrando algorithms.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: PARK, Chong Shik (Korea University Sejong Campus)

Presenter: PARK, Chong Shik (Korea University Sejong Campus)

Session Classification: MC05.3 - Beam Dynamics and Electromagnetic Fields (Contributed)

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D03: Calculations of EM fields Theory and Code Developments