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Transfer Matrix for combined RF and Solenoid Fields

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We present a new method for computing the transverse transfer matrix through superimposed axisymmetric RF and solenoid field maps. The algorithm constructs the transfer matrix directly from one dimensional RF and solenoid field maps without computing numerical derivatives or eigenfunction expansions of the field map data. In addition, this method accurately describes the dynamics of low energy particles starting from a solenoid immersed cathode, allowing the method to be used to simulate transport through both RF and electrostatic guns. Comparison of particle tracking with the transfer matrix and direct integration of the equations of motion through several field set-ups shows excellent agreement between the two methods.

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