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DESIGN OF A CONDITIONER FOR A HELICALLY TRANSPORTED BEAM*

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A guiding-center kinetic theory is developed to investigate a scheme for beam conditioning which consists of a microwave cavity operating in the TE_{011} mode and immersed in a uniform axial magnetic field. In the conditioner, a pulsed beam of helically transported electrons is passed through the cavity at a proper phase so that the electrons have a net loss of energy. The electrons with larger gyration radius lose more energy than those with smaller gyration radius because of the field distribution of a first order Bessel function so that the spread in axial velocity of the beam can be effectively reduced (because of the coupling with axial velocity through the electron's mass). The analytical expression for RMS-normalized axial velocity spread is derived and some numerical results are given.

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