

Abstract Submitted  
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**Adiabatic thermal beam equilibrium in an alternating-gradient focusing channel**<sup>1</sup> CHIPING CHEN, KSENIA SAMOKHVALOVA, MIT, JING ZHOU, Beam Power Technology — An adiabatic warm-fluid equilibrium theory for a thermal charged-particle beam in an alternating-gradient (AG) focusing field is presented. Warm-fluid equilibrium equations are solved in the paraxial approximation. The theory [K.R. Samokhvalova, J. Zhou and C. Chen, Phys. Plasmas **16**, 043115 (2009)] predicts that the 4D rms thermal emittance of the beam is conserved, but the 2D rms thermal emittances are not constant. The rms beam envelope equations and the self-consistent Poisson equation, governing the beam density and potential distributions, are derived. Although the presented rms beam envelope equations have the same form as the previously known rms beam envelope equations, the evolution of the rms emittances in the present theory is given by analytical expressions. The density does not have the simplest elliptical symmetry, but the constant-density contours are ellipses, and the aspect ratio of the elliptical constant-density contours decreases as the density decreases along the transverse displacement from the beam axis.

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