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P2.2021 Cylindrical fast electron beam in a plasma density gradient

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See the full abstract here
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A theoretical study of a uniform fast electron beam propagating in a plasma density gradient targets (low density core-high density cladding) is presented. The self-generated magnetic field is calculated using a rigid beam model in cylindrical geometry. It is found that the spontaneous magnetic field peaks at the interface and evanesces exponentially into the outer target over a characteristic skin depth. This method is used for reducing the transverse angular distribution of a fast electron beam (control of the divergence of fast electron beams). The numerical simulations showed that a low density core-high density cladding structure target in Cartesian geometry can also generate a mega gauss interface magnetic field, which collimates fast electrons [1-3].

[1] C. T. Zhou et al., Phys. Plasmas 17, 083103 (2010)
[2] S. Z. Wu, C. T. Zhou, and S. P. Zhu, Phys. Plasmas 17, 063103(2010).
[3] H. Cai, S. Zhu, M. Chen, S. Wu, X. T. He, and K. Mima, Phys. Rev. E 83, 036408 (2011).

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