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Fluid Simulation of relativistic electron beam driven wakefield in the blowout regime[1] RATAN KUMAR BERA, AMITA DAS, SUDIP SENGUPTA, Inst for Plasm Res — Two-dimensional Fluid simulations are employed to study the Wakefield driven by an electron beam in a plasma medium. The 1-D results (Phys. of Plasmas, 22, 073109 (2015)) are recovered when the transverse extent of the beam is chosen to be much longer than its longitudinal extent. Furthermore, it is shown that the blowout structure matches closely with the PIC observations, before the phase mixing. A close comparison of the fluid observations with the analytical modeling made by Lu et al. (Phys. Rev. Lett., 96, 165002 (2006)) to PIC observations, have been provided. It is thus interesting to note that a simplified fluid simulation adequately represents the form of the wake potential obtained by sophisticated PIC studies. We also address issues related to particle acceleration in such a potential structure by studying the evolution of injected test particles. A maximum energy gain of $\sim 2.8GeV$ by the electrons from the back of the driver beam of energy $\sim 28.5GeV$ in a 10 cm long plasma is shown to be achieved. This is in conformity with the experimental result of ref. (Phys. Rev. Lett, 95, 054802 (2005)). We observe that maximum energy gain can get doubled to $\sim 5.7GeV$ when the bunch of test particles was placed near the axial edge of the first blowout structure.

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