

Beam loading effect in laser wakefield acceleration of a finite charge electron beam

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The development of an efficient method of particle acceleration is one of the priority tasks of modern physics. Laser-plasma accelerators are among the most promising candidates for solving this problem of efficient acceleration. However, in accelerators of this type, at the values of the charge of accelerated beams required for applications, the influence on the acceleration process of the own charge of the accelerated electron beam (beam loading effect) begins to play a significant role [1, 2]. To take into account this effect, a modification of the quasi-static code WAKE [3] was made. Based on the simulation performed using this code, the influence of the beam loading on the final parameters of the accelerated beam is investigated. The parameters of the plasma, laser pulse and beam of accelerated electrons are proposed for efficient acceleration of this beam in several stages of the multistage Laser-WakeField accelerator, taking into account the beam loading effect.

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