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Magnetic Field Generation in Inhomogeneous Plasma via Ponderomotive Force

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Abstract : A new mechanism is reported here for magnetic field generation in laser-plasma interaction by means of nonlinear ponderomotive force. The plasma considered here is unmagnetized inhomogeneous plasma with an exponentially decreasing profile. A damped periodic magnetic field with a relatively lower frequency is obtained using the ponderomotive force exerted on plasma electrons. Finally, with an electric field and by using Faraday's law, the magnetic field profile in the plasma has been obtained. Because of the negative exponential density profile, the generated magnetic field is relatively slowly oscillating and damped through the plasma.

Keywords : magnetic field generation, laser-plasma interaction, ponderomotive force, inhomogeneous plasma
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