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Stabilization Effect of Weibel Modes in Relativistic Laser Fusion Plasma

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In this work, the Weibel instability due to inverse bremsstrahlung (IB) absorption in laser fusion plasma has been investigated. The stabilization effect due to the coupling of the self-generated magnetic field by Weibel instability with the laser wave field is explicitly showed. In this study, the relativistic effects are taken into account where the basic equation is the relativistic Fokker-Planck (F-P) equation.

The main obtained result is that the coupling of self generated magnetic field with the laser wave causes a stabilizing effect of excited Weibel modes. We found a decrease in the spectral range of Weibel unstable modes. This decreasing is accompanied by a reduction of two orders in the growth rate of instability or even stabilization of these modes. It has been shown that the previous analysis of the Weibel instability due to IB have overestimated the values of the generated magnetic fields. Therefore, the generation of magnetic fields by the Weibel instability due to IB should not affect the experiences of inertial confinement fusion.

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