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Effect of a wiggler magnetic field and the ponderomotive force on the second harmonic generation in laser-plasma interactions

Hassan Ranjbar ASKARI and Maryam NOROOZI

Department of Physics, Faculty of Science, Vali-e-Asr University,
Rafsanjan-IRAN

e-mail: hraskarivaliasr@yahoo.com, sama_noroozi_2006@yahoo.com

 [Keywords](#)
 [Authors](#)



phys@tubitak.gov.tr

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Abstract: In this paper, we consider second harmonic generation and its phase-matching in an underdense plasma in the presence of a wiggler magnetic field. Wiggler magnetic field plays both a dynamic role in producing the traverse harmonic current and a kinematical role in ensuring phase-matching. The inertial ponderomotive force $\rho (\vec{u} \cdot \nabla) \vec{u}$ is a source of harmonic generation. \vec{u} beats with itself to produce a different harmonic. The inertial ponderomotive force can also affect the efficiency of second harmonic generation; and its effect on second harmonic generation is also considered.

Key Words: Second harmonic generation, wiggler magnetic field, nonlinear optics, phase-matching, plasma

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