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Diagnostics of a magnetized plasma by PDO radiation[1] MIN SUP HUR, HYUNG SEON SONG, TEYOUN KANG, SALIZHAN KYLYCHBEKOV, Ulsan Natl Inst of Sci Tech — We investigated the spectral properties of a radiation emitted from a plasma dipole oscillation (PDO) in a magnetized plasma and its use for plasma diagnostics. The PDO is a noble concept of generating a localized bunch of electrons, which oscillate in-phase with the plasma frequency. It resembles the pedagogical slab model of the plasma oscillation, but actually has much richer nonlinear physics such as high harmonics. The PDO can be generated from two colliding laser beams. Originally the PDO was devised for use as strong high-frequency radiation sources (Kwon et al., SREP 2017). We soon found that the PDO can be used as a novel diagnostic method for pin-point detect of plasma density and reconstruction of density profiles (Kylychbekov et al., PSST 2020). In this work we studied the PDO in a magnetized plasma, using two-dimensional particle-in-cell simulations. The magnetized PDO is found to oscillate with right- and left-handed cut-off frequencies of the X-mode. The frequency of the radiation emitted from the PDO exactly corresponds to the cut-off frequencies of the X-mode, from which the informations of local magnetic field and density can be extracted. The polarization property of the radiation is analyzed by 3D PIC simulations.

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Min Sup Hur
Ulsan Natl Inst of Sci
Tech

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