Clarification of THz Electromagnetic Radiation mechanism from the Laser Produced Plasma MASATAKA HIDETA, YUSUKE HYUGA, Utsunomiya Univ, YASUHIKO SENTOKU, Nevada Univ, NOBORU YUGAMI, Utsunomiya Univ — Conical forward Terahertz radiation from ultra-short pulse laser produced plasma has been observed [1] [2]. The radiation frequency is smaller than the plasma frequency that is estimated by the initial gas density and laser intensity. This radiation mechanism has not been clarified. To study the radiation mechanism, 2D PIC code is used. The radiation is described by the following equation,

$$\left(\nabla^2 - \frac{1}{c^2}\frac{\partial^2}{\partial t^2} + \frac{\omega_p^2}{c^2} \right) B = \mu_0 e \nabla n \times v$$

where, ω_p, n and $\boldsymbol{v}$ represent the plasma frequency, the plasma density and the electron velocity, respectively. The right hand side is considered as the radiation source which strongly depend on the gradient of the plasma density and the electron velocity. In the experiment, the laser propagates with creating the plasma, the plasma density profile is a function of the radial direction. Therefore, the strong gradient is at the edge of the plasma column, not the center of the plasma, the radiation is expected to generate there and its frequency is also equal to the local plasma frequency. The 2D calculation shows the EM wave is generated around the edge of the plasma column and its frequency is lower than the plasma frequency. [1] N. Yugami *et al.*, Jpn. J. Appl. Phys., **45,** L1051 (2006). [2] C. D'Amico *et al.*, Phys. Rev. Lett., **98**, 235002 (2007). [3] H.-C. Wu *et al.*, Phys. Rev. E **83**, 036407 (2011).

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