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Generation of lower harmonic radiation by a strong laser plasma interaction with asymmetrically bundled carbon nanotubes¹ TOSHIHIRO TAGUCHI, MASAHIKO INOUE, Setsunan University, THOMAS ANTONSEN, University of Maryland — We have investigated a generation of low frequency radiation by an interaction between a strong laser field and nano particles, such as clusters or carbon nanotubes (CNTs), using PIC simulations. As known well, a single mode laser irradiation is not enough to generate the lower harmonics and the second harmonic laser must be added. The main reason of this problem is that the single mode laser can only induce odd harmonic oscillations on electrons. The odd harmonic generation is due to the symmetric shape of the targets, spherically for clusters and cylindrically for CNTs. The symmetric ion structure produces a symmetric electrostatic potential in a target and the potential exerts an antisymmetric forces on electrons. This is why only the odd harmonics are generated by the monochromatic laser. This indicates that the possibility of the even harmonic excitation exists when the potential structure is not symmetric. Since carbon nanotubes are synthesized on metal catalysts, the shape of the bundled CNTs can be changed by the shape of the catalysts. We performed PIC simulations of laser plasma interaction with a carbon nanotube of a shape like an egg. As a result, we found that even modes are generated as well as odd modes and lower harmonic oscillation is also excited.

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Toshihiro Taguchi
Setsunan University

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