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Interaction between high power laser and clustered medium - propagation, acceleration, and radiation Y. KISHIMOTO, N. IWATA, Y. SUGUYAMA, T. UCHIDA, Y. FUKUDA, Kyoto University, Japan — A clustered medium has been found to exhibit prominent features in the interaction with a laser, e.g. the existence of polarization wave [1], high absorption efficiency of laser light, high energy particle acceleration, highly chaotic particle motions and associated emission of energetic radiation. Recently, signatures of high energy ion acceleration with 10-20 MeV per nucleon were observed in a clustered medium. A channeling over Rayleigh length was also detected. Here, we studied the characteristics of clustered medium irradiated by high power lasers using a particle based integrated code, EPIC3D, where key physical processes such as ionization, collisional relaxation, radiation damping, etc. are taken into account. The interaction is dominated not only by the averaged quantities, e.g. averaged cluster size and packing fraction, but also by their probabilistic configuration. The generation of high energy ions which range is the same order as the experiments [1] was observed. We also study the propagation dynamics of laser regulated by the cluster expansion and associated complex density profile with high fluctuation level.

[1] T. Tajima et al., Phys. Plasmas 6, 3759 (1999).

[2] Y. Kishimoto et al., Phys. Plasmas 9, 589 (2002)

Yasuaki Kishimoto
Kyoto University

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