Development of a collisional PIC code for an analysis of cluster plasmas TOSHIHIRO TAGUCHI, Setsunan University, THOMAS ANTONSEN, HOWARD MILCHBERG, University of Maryland — We have developed a new particle-in-cell (PIC) code with ionization and collisional processes to analyze an interaction between a strong laser field and cluster plasmas. The code includes field and collisional ionization processes, electron-electron collisions by means of a Langevin type stochastic acceleration and electron-ion scattering. Using our new code, we analyzed the dynamics of a single cluster under a strong alternating electric field, which simulates a strong laser field in a range of 10^{14}–10^{17}W/cm^2. The results show that the code has a capability to simulate a dynamical behavior of an Argon cluster from the aggregation of neutral atoms to a rapidly expanding plasma heated by a strong laser field. The results also show that a resonant heating at a specific laser intensity whose value depends on a size of the cluster, as we reported in the references.

[1] T. Taguchi, et al., Phys. Rev. Lett., 92, 20, 2004, 205003.
[2] T. M. Antonsen, Jr., et al., Phys. Plasmas 12, 5, (2005), 056703.

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