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PIC-DSMC analysis on interaction of a laser induced discharge and shock wave[1] KOHEI SHIMAMURA, University of Tsukuba — Laser induced discharge and the shock wave have attracted great interest for use in the electrical engineering. When the high intensity laser (10 GW >) is focused in the atmosphere, the breakdown occurs and the discharge wave propagates toward to the laser irradiation. The shock wave is generated around the discharge wave, which is called as the laser supported detonation wave. After breakdown occurred, the initial electron of the avalanche ionization is produced by the photoionization due to the plasma radiation. It is well recognized that the radiation of the laser plasma affects the propagation mechanism of the laser induced discharge wave after the initiation of the breakdown. However, it is difficult to observe the interaction between the plasma radiation and the electron avalanche in the ionization-wave front in experimentally except in the high intensity laser. In the numerical calculation of the laser-induced discharge, the fluid dynamics based on the Navier-Stokes equation have been widely used. However, it is difficult to investigate the avalanche ionization at the wave front using the fluid dynamics simulation. To investigate the interaction of the ionization-wave front and the shock wave, it is appropriate to utilize the PIC-DSMC method. The present study showed the propagation of the ionization front of the discharge wave and the shock wave using the particle simulation.

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Kohei Shimamura
University of Tsukuba

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