

Abstract Submitted
for the GEC05 Meeting of
The American Physical Society

Basic Study of Discharge Simulation with Relaxation Process of Electron Swarm for Plasma Display Panel YUKIO MURAKAMI, NHK Sci. Tech. Res. Labs., KEIICHI KONDO, Gaseous Electronics Inst. — Plasma display panels (PDPs) with a thin profile and a wide screen are widely used in displays for digital high-definition television broadcasting, etc. For further popularization of PDPs, the vacuum ultraviolet (VUV) radiation mechanism in microdischarge cells is determined by discharge simulation with the aim of achieving a lower power consumption. Although in ordinary discharge simulations, a fluid model with local field approximation (LFA) is widely used, the possibility of new analysis considering the relaxation process of electron swarms for high-precision analysis under a markedly changing electric field in a cell-like alternating current (AC) type PDP or radio-frequency field is examined. The time-dependent Boltzmann equation, which is transformed to the matrix representation of the Burnett basis function, is used for the analysis of the relaxation processes. For rare and mixed gases, relaxation processes of electron energy distribution function (EEDF) and its swarm parameters, such as drift velocity and mean energy, in applying step and repetitive pulsed electric fields under the condition of conventional PDPs were calculated. Considering these relaxation processes in the near future, a high-precision simulation will be developed in which the analysis of the short time evolution of the EEDF is possible, and the VUV radiation mechanism will be clarified in detail expecting advancement in the search of the high-efficiency new discharge mode.

Yukio Murakami
NHK Science and Technical Research Laboratories

Date submitted: 07 Jun 2005

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