

Fellner, Klemens; Kniely, Michael**Uniform convergence to equilibrium for a family of drift-diffusion models with trap-assisted recombination and self-consistent potential.** (English) [Zbl 1479.35859](#)[Math. Methods Appl. Sci. 44, No. 17, 13040-13059 \(2021\).](#)

Summary: We investigate a recombination-drift-diffusion model coupled to Poisson's equation modelling the transport of charge within certain types of semiconductors. In more detail, we study a two-level system for electrons and holes endowed with an intermediate energy level for electrons occupying trapped states. As our main result, we establish an explicit functional inequality between relative entropy and entropy production, which leads to exponential convergence to equilibrium. We stress that our approach is applied uniformly in the lifetime of electrons on the trap level assuming that this lifetime is sufficiently small.

MSC:[35Q81](#) PDEs in connection with semiconductor devices[78A35](#) Motion of charged particles[35B40](#) Asymptotic behavior of solutions to PDEs[35K57](#) Reaction-diffusion equations**Keywords:**[entropy method](#); [exponential convergence to equilibrium](#); [PDEs in connection with semiconductor devices](#); [reaction-diffusion equations](#); [self-consistent potential](#); [trapped states](#)**Full Text:** [DOI](#) [arXiv](#)