SPACE CHARGE WAVE DISPERSION IN SILICON WITH ACCOUNT OF HEAT CONDUCTIVITY AND QUANTUM PROPERTIES OF ELECTRON

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S u m m a r y

An analysis that incorporates quantum corrections and the thermal conductivity term into the classical hydrodynamic model of the propagation of space-charge waves in silicon is presented. From numerical simulations, it is seen that, for frequencies $f <$ 8 THz, the classical hydrodynamic model (HD) with the thermal conductivity term and with quantum corrections gives good results, where the thermoconductivity seems to be more essential for these frequencies at room temperature. However for higher frequencies $f > 8$ THz, both quantum corrections and thermoconductivity are important. These results suggest that the accurate simulations of an ultra-small device require the thermal conductivity term to be included in the model.