

Propagation of Strong Electromagnetic Waves in Semiconductors with S-shaped Current Voltage Characteristics

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It is well known that some semiconductors exhibit a S-shaped dependence of the electron temperature with the local electric field. Usually such dependence leads to the same kind of dependence in the current-voltage characteristics [1, 2].

In this work we will present the theory of the propagation of strong electromagnetic waves in such media. In our study we have found that a semi-infinite semiconductor when excited with a strong electromagnetic wave will exhibit an internal discontinuity of the electrical permittivity. The position of this discontinuity is found to be a function of the magnitude of the electromagnetic wave (E_0).

From the an application point of view, this property can be exploited to design a Fabry-Pérot interferometer. The thickness of this interferometer can be modulated by E_0 . As a consequence of the above described, the reflectance value will exhibit an oscillatory dependence with the magnitude of the electromagnetic wave.

REFERENCES

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2. Baas, F. G. and Y. G. Gurevich, *Sov. Phys., JETP*, Vol. 28, 572, 1969.