World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

# Analysis of the Temperature Dependence of Local Avalanche Compact Model for Bipolar Transistors

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**Abstract :** We present an extensive analysis of the temperature dependence of the local avalanche model used in most of the modern compact models for bipolar transistors. This local avalanche model uses the Chynoweth's empirical law for ionization coefficient to define the generation of the avalanche current in terms of the local electric field. We carry out the model analysis using DC-measurements taken on both Si and advanced SiGe bipolar transistors. For the advanced industrial SiGe-HBTs, we consider both high-speed and high-power devices (both NPN and PNP transistors). The limitations of the local avalanche model in modeling the temperature dependence of the avalanche current mostly in the weak avalanche region are demonstrated. In addition, the model avalanche parameters are analyzed to see if they are in agreement with semiconductor device physics.

**Keywords :** avalanche multiplication, avalanche current, bipolar transistors, compact modeling, electric field, impact ionization, local avalanche
**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development
**Conference Location :** Chicago, United States
**Conference Dates :** December 12-13, 2020