DETERMINE COEFFICIENT IN WORKING PARTITION AT NEW MANNER TO SIMULATION

Ilya Trendafilov Tanchev

Department Telecommunication, Technical University Varna, Studentska Street No.1, Post Code (9000) VARNA, BULGARIA, phone: +359 52 383 230, e-mail: itta@ms3.tu-varna.acad.bg

In theory popularly method of determine coefficient of working area by simulation is method Newton- in certain cases method of tangential abutment (interface). For resolve process use method of spiral, method of chord or method of initial straight line. Each case looks of value from approximation based in new iteration, new line, or new chord and new spiral. First approximation is logical et make of chosen accuracy. By spiral possibility pass each other in point of working array. All method no used or no define working array. By analysis simulations every time know accuracy witch worked. In this case better use two specialty: 1) Let's go definite area in will look decision and make criterion. 2) Will find resolve at explicit area with start giving precision. This paper present new criterion of fix and set coefficient witch define working area. Algorithm of research new parameter (coefficient) based of mathematical transformation by change mark of number (coefficient). Burden line and working characteristic be shape up quadrilateral.

Keywords: range area; coefficient of working area; models for simulation.

1. INTRODUCTION

Define the working array and working point by non lineal analysis the circuit in integrated array and simulators is very important question. This question discus very by models with parameters in work the simulators. Until recently consider that is good [4] by models is defined in system of mathematical equation and resolve this system is fixing the working point also fix the working array. Become perfect the simulators and array by simulation and increment the potentiality by hybrid (mix) simulation you raise the requirements the models work in this array.

Define the working part is not focus and to be concentrated on working point and value round this point. For working array result define whit value and parameters with his parameters going out this array. Value is outside range. Algorithm with calculate working array not foresight by two causes. Firstly – engage additional resource, but his shortly deficit by computers systems, and secondly be based on rule by working array is around working point. This premise have normal logic but when over and over again increase accuracy and perfect models and working algorithm by signification correct definition of working array and algorithm by fixing his and working point. Some more by simulation test frequently lay extra experiments by particularization or trace different variants by one working array with change someone value in this array. (by elements, by models).

2. THEORY EXPLANATION

By theory description of model the ideal diode [1, pp.160] have validity in mathematical method by equations. Generally error is accumulating from associate circuitry on attitude change their scheme parameter. Determination on sensitivity of the functions orderly continues methods to gradations (Fletcher-Pauer, quickly reduction,…) For most elementary event when viewing the nonlinear model semi-conductor of the diode - in ideal variant he has one p-n-p transition in ideal variant he has one p-n-p transition and his(its) volt-ampere feature will:

$$I_d = I_s\left(e^{U_D/U_T} - 1\right), \tag{1}$$

were;

I_d and U_D is current [A] and tension [V] by diode;

I_s currant saturation by diode (reverse currant) [A];

U_T - temperature potential. Determine by formula:

$$U_T = \frac{kT}{q}, \tag{2}$$

were;

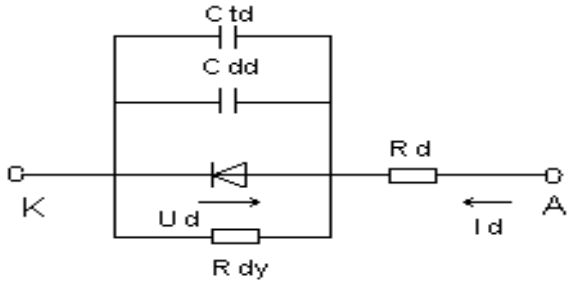
k – constant of Bolkcman ($k = 1{,}3810.10^{-23}$ [J/K]);

T – absolutely temperature, K;

q – charge of the electron;

e – constant e = 2.71828

In real diode have influence and next factors by equivalent scheme (fig.1.):



Rd volumetric resistance.
Rdy leak resistance
CTd barrier capacitance (for relationship on turn)
CDd capacity to diffusions (for ruling relationship)

Fig.1. *Shem ideal diode*

Dynamic characteristic diode defines by capacitance barrier C_{Td} при (back to front connection) and diffusion capacitance C_{Dd} (by direct connection).

Mathematical this way possibility present by:

$$Id = Ido.e^{Kd\Delta t}\left(e^{Ud/MdU_T} - 1\right), \tag{3}$$

$$\Delta t^\circ = t^\circ - 25^\circ, \tag{4}$$

$$U_T = \frac{t^\circ + 273}{11600}, \tag{5}$$

$$Rd = Q_0 + Q_1 Id + Q_2 Id^2 + Q_3 Id^3, \tag{6}$$

$$Rdy = \frac{Ud^=}{Id^=}, \tag{7}$$

Where; $Ud^=$ and $Id^=$ is opposite tension and currant of diode and t^o is ascendance the temperature over normally.

For first approximation (as main parameters) in model of the diode there is whole 9 parameters; Ido, Md, Kd, Qo, Q1, Q2, Q3, Rdcp, Rdy.

Md – gives amount constructive parameters on transition – this is issuing parameter.

Rdcp – middle value three-dimensional resistance Rd.

Rdy - leak resistance

Rest parameters - this is coefficient. (for analysis we consider their it is enough definite)

Solution the equations give by iterations method. For non lineal analysis resolve by decision the equation the diode by presented graphical; (fig. 2); [2], [3] :

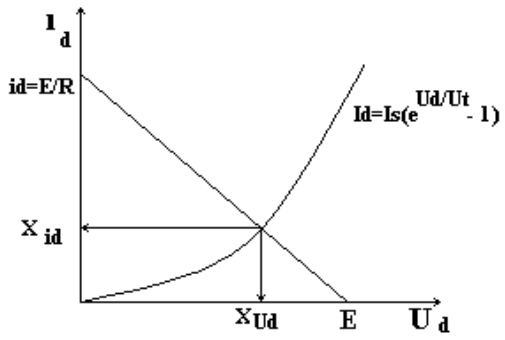


Fig. 2. *Define the working point*

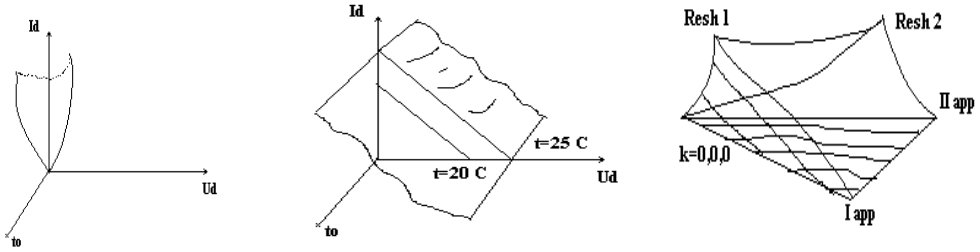


Fig. 3. *Approach by;* a/ *by two parameters* b/ *by one parameter and constants* c/ *by 3-D approach*

Method with approach and method of contact (methods Newton) numeric decision will possible present with approach of contact – coordinate Udo - Ido, but decision to linear function is got at decomposition in row Taylor:

$$Id = ido + \left(\frac{Did}{dUd}\right)\Big|_{Ud=Udo} . \Delta Udo \quad , \qquad (8)$$

Where: $\Delta Udo = Ud - Udo$

Working array possibility presented graphical in (fig. 3.) by same authors [3].

In the theory certain method is some more method the spiral (fig. 4.), method of tangential abutment (fig. 5.), and method of initial straight line (fig. 6.).

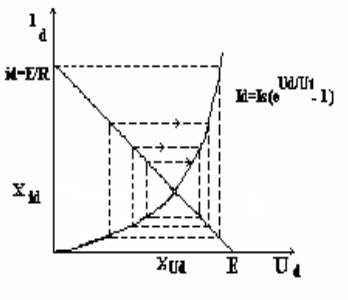


Fig. 4. *Method the spiral*

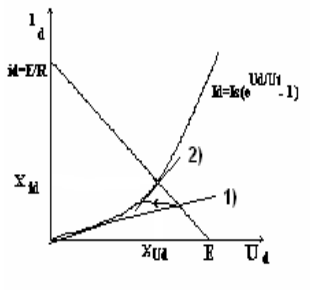


Fig. 5. *Method of tangential abutment*

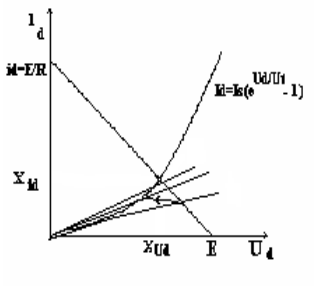


Fig. 6. *Method of initial straight line*

This paper offered new criterion of fix and set coefficient witch define working area. New algorithm consist in the research working point by deferent means of know. Working point the (fig. 7.) calculate whit mathematical mode for divisions into two for value of currant resolve the position. For each step in mathematical means research value equations. In the same breath watched closely of criteria descript downhill.

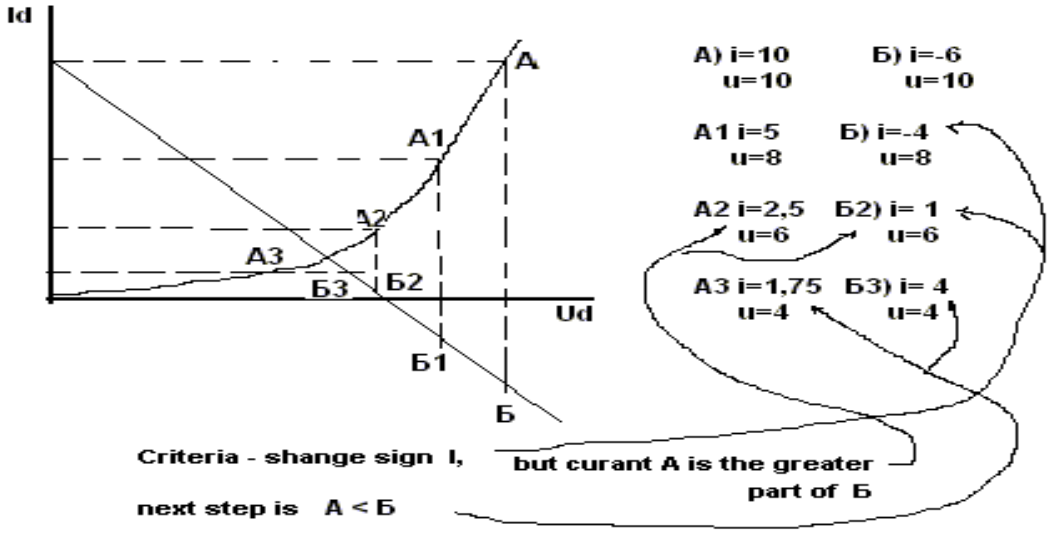


Fig. 7. *Define the working point*

The (fig. 7.) presented case by graphic is non lineal and point is the position of exponent. By division currant of two ask the point A-A1. Mathematical this way presented in value in point A by currant and tension. Approaching point A of exponent by working straight line receives the point Б. Point A1 is step by division currant to two equal parts. Approaching point A1 and receiving point Б1. Also this manner gives point A2 and Б2 et. point A3 and Б3. In this case result of p. A3 and approach the p. Б3 yourself stand the left side graphical and point is resolve by division. Approach not needed. Line is horizontal.

Criteria of method find out of tree position by step. First position finned change the sing the currant in the same breath watch closely magnitude the two parts in the result. If the part A is the greater of the Б to division continue. When the part A is the small of the Б, (the result is presented the diagram at numeral), find new verification. By next step ask result of change sign or part A small the Б. When and this condition is realized, be able define working array (fig. 8.) by received point. In the case by diagram working array get the point A2, A3, Б3 and the approach point Б2 to Б2'.

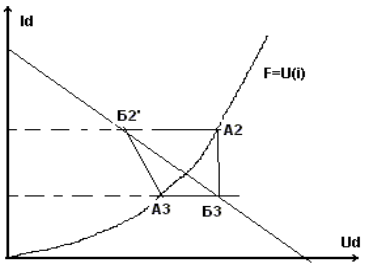


Fig. 8. *Trapezium approach Б2'*

3. CONCLUSION

- New manner by define coefficient give possibilities of economic resources by calculations of parameters by models with simulators.

- Define the working array by models for non lineal analysis give possibilities of reduce resources.

- New manner fallow calculations on characteristics curve and reach fast resolve.

4. REFERENCES

[1] Боянов Й. Л. Райковска, В. Фурнаджиев, "Автоматизация на проектирането и конструирането в електрониката" Техника, София, 1991г.

[2] Райковска Л., Е. Гаджева, "Автоматизация на проектирането в електрониката и комуникациите – Моделиране и симулация с OrCAD PSpice" , Meridian 22, София, 2005г

[3] Tanchev I., V. Draganov, Hr. Jekova, "Determine processing for simulate to design in electronics", UNITECH 2003, TU Gabrovo, 20-21 November, 2003г. ISBN 954-683-167-0, pp. I-154 – I-157

[4] Сендов Б., В. Попов, "Числени методи", Наука, София, 1976г.