PRADIS

REFERENCE BOOK ON THE MODELS
MODULE ELECTRONICS

THE SOFTWARE FOR SIMULATION OF NON-STATIONARY PROCESSES IN MECHANICAL SYSTEMS AND SYSTEMS OF OTHER PHYSICAL NATURE

VERSION 4.3

Contents

1. Electron models for the temporary analysis

1.1. E - Model of steady source emf.

NAME: Source of electric potential, constant.

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 potential of the 1st conclusion of the element
potential 2 is 2nd -GO of the conclusion of the element

PARAMETERS:
1 potential
it is 2nd the internal resistance of the source (RVNUTR > 0).

1.2. ESIN - Source emf of sinusoidal form.

NAME: Source of electric potential,
changing about the sinusoidal law.

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 potential of the 1st conclusion of the element
potential 2 is 2nd -GO of the conclusion of the element

PARAMETERS:
1 amplitude of the potential
it is 2nd the internal resistance of the source (RVNUTR > 0).
3- the period of changing of the potential (PERIOD > 0).
4 initial phase.

1.3. R- Resistor

NAME: Resistor.

FIELD OF APPLICATION : Electronics.

DEGREES OF FREEDOM:
1 the 1st potential
the 2nd potential is 2nd

PARAMETERS:
1 resistance of the resistor (RVNUTR > 0).

1.4. VT - Bipolar transistor

NAME: Bipolar transistor.
HELP

FIELD OF APPLICATION: Electronics

DEGREES OF FREEDOM:
1 potential of the base of the element
the potential of the emitter of the element is 2nd
3- the potential of the collector of the element

PARAMETERS:
1 saturation current (IS > 0).
the straight gear ratio of the current (BN > 0) is 2nd.
3- the reverse gear ratio of the current (BI > 0).
4 stress of the breakdown (UP > 0).
the saturation current of the breakdown (I0 > 0) is 5th.
6 value of constant T (T >= 0).
7 initial barrier capacity of the p-n junction (CB0 >= 0).
is eighth the type of the transistor P = 1, n-p-n (P = 1).
P = - 1, p-n-p (P =- 1).
9 coefficient A = V/FT - stress,
with which the function of current begins
to be approximated by tangent to the graph (A > 0).

1.5. VP - Field-effect transistor

NAME: Field-effect transistor.
HELP

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 potential of the lock of the element
the potential of the source of the element is 2nd
3- the potential of the drain of the element
PARAMETERS:
1 saturation current (IDSS > 0).
it is 2nd cutoff voltage (UP > 0).

1.6. VD - The semiconductor diode

NAME: Semiconductor diode.
HELP

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 potential of the anode of the element
the potential of the cathode of the element is 2nd
PARAMETERS:
1 saturation current (IS > 0).
it is 2nd value [postoyanoy] T (T >= 0).
3- the initial barrier capacity of the p-n junction (CB0 >= 0).
4 stress of the breakdown (UP > 0).
the saturation current of the breakdown (I0 > 0) is 5th.
6 coefficient A = V/VT - stress,
with which the function of current begins
to be approximated by tangent to the graph (A > 0).

1.7. TRANSF - Transformer

NAME: Transformer.
HELP

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 potential of the first output of the primary winding
the potential of the second output of the primary winding is 2nd
3- the potential of the first output of the secondary winding
4 potential of the second output of the secondary winding

PARAMETERS:
1 transformation ratio S (S > 0).
it is 2nd the mutual inductance of the windings by M (M * M < L1 of *L2).
3- primary inductance L1 (L1 > 0).
4 secondary inductance L2 (L2 > 0).

1.8. OU - The operational amplifier

NAME: The operational amplifier
HELP

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 the straight entrance
the inverting entrance is 2nd
3- the output
4 the inverting output
plus of the feeding is 5th
6 minus of the feeding

PARAMETERS:
1 input resistance (R2 > 0).
it is 2nd the resistance of the arm (R1 > 0).
3- the output resistance (R4 > 0).
4 mu-factor (K > 0)

1.9. GKCH - *Generator of the being rocked frequency*

Source of the electric potential of the sinusoidal form
with the variable period.
NAME:Generator of the being rocked frequency

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 potential of the 1st conclusion of the element
potential 2 is 2nd -GO of the conclusion of the element

PARAMETERS:
1 amplitude value of the potential;
it is 2nd the internal resistance of the source;
3- the initial period of [izmenieniya] of force (T0);
4 initial phase (Fi)
it is 5th to by how many times increase the period

2. Electron analogues for the frequency response analysis

2.1. FR - Resistor for the frequency response analysis

NAME: Resistor.

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 1st potential of real component of signal.
2-1 - [yy] the potential of imaginary component of signal.
3- the 2nd potential of real component of signal.
4 2nd potential of imaginary component of signal.
the potential of angular frequency is 5th.

PARAMETERS:
1 resistance of the resistor (RVNUTR > 0).

2.2. FC - Capacitor for the frequency response analysis

NAME: Capacitor

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 1st potential of real component of signal.
2-1 - [yy] the potential of imaginary component of signal.
3- the 2nd potential of real component of signal.
4 2nd potential of imaginary component of signal.
the potential of angular frequency is 5th.

PARAMETERS:
1 capacitance of the capacitor (EM > 0).

2.3. FE - Source of potential with the sweep frequency for the frequency response analysis

NAME: Source of potential with the sweep frequency
for the frequency response analysis.

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 1st potential of real component of signal.
2-1 - [yy] the potential of imaginary component of signal.
3- the 2nd potential of real component of signal.
4 2nd potential of imaginary component of signal.
the potential of angular frequency is 5th.

PARAMETERS:
1 emf of real component.
is 2nd emf of imaginary component.
3- the internal resistance of the source of the signal (R > 0).
4 internal resistance of the source of the frequency (R > 0).
it is 5th initial frequency, Hz (W0 > 0).
6 final frequency, Hz (WK > 0).
7 time of the calculation (T > 0).

2.4. FL - Inductance for the frequency response analysis

NAME: Inductance.

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 1st potential of real component of signal.
2-1 - [yy] the potential of imaginary component of signal.
3- the 2nd potential of real component of signal.
4 2nd potential of imaginary component of signal.
the potential of angular frequency is 5th.

PARAMETERS:
1 inductance (EM > 0).

2.5. FVT - Low-signal model of bipolar transistor for the frequency response analysis

NAME: Low-signal model of bipolar transistor.
HELP

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 potential of real component of base.
the potential of imaginary component of base is 2nd.
3- the potential of real component of emitter.
4 potential of imaginary component of emitter.
the potential of real component of collector is 5th.
6 potential of imaginary component of collector.
7 frequency.

PARAMETERS:
1 saturation current (IS > 0).
the straight gear ratio of the current (BN > 0) is 2nd.
3- the reverse gear ratio of the current (BI > 0).
4 type of the transistor P = 1, n-p-n (P = 1).
P = - 1, p-n-p (P =- 1).
it is 5th stress the base - emitter.
6 stress is the base - collector.

2.6. FOU - Operational amplifier for the frequency response analysis

NAME: The operational amplifier
HELP

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 potential of real component, the straight entrance
are 2nd the potential of imaginary component, the straight entrance
3- the potential of real component, the inverting entrance
4 potential of imaginary component, the inverting entrance
are 5th the potential of real component, the output
6 potential of imaginary component, the output
7 potential of real component, the inverting output
are eighth the potential of imaginary component, the inverting output
9 the frequency

PARAMETERS:
1 input resistance (R2 > 0).
it is 2nd the resistance of the arm (R1 > 0).
3- the output resistance (R4 > 0).
4 mu-factor (K > 0)
it is 5th the frequency of bend A ch X (before Hz) (W0 > 0)

3. OVP for the temporary analysis

3.1. GARMON - Conclusion of the spectrum of the signal

NAME: Derivation of the coefficients of the harmonics of the components signal.

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 current.

PARAMETERS:
1 period of the fundamental harmonic (T > 0).

3.2. ACHH - Conclusion it is amplitude - the frequency characteristic

NAME: conclusion it is amplitude - by Jaras's frequency - Ci.

FIELD OF APPLICATION : Electronics

DEGREES OF FREEDOM:
1 1st potential of input signal.
the 2nd potential of input signal is 2nd.
3- the 1st potential of output signal.
4 2nd potential of output signal.

PARAMETERS:
1 coefficient N = 5, 10, 15…

4. OVP for the frequency response analysis

4.1. FFCHH – Calculation of the phase- frequency characteristic

NAME: the calculation of the phase- frequency characteristic

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 1st potential of real component.
2-1 - [yy] the potential of imaginary component.
3- the 2nd potential of real component.
4 2nd potential of imaginary component.

PARAMETERS:
1 scale.

4.2. FACHHU - Calculation of the amplitude - frequency characteristic

NAME: calculation of the amplitude - frequency characteristic

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 1st potential of real component of input signal.
2-1 - [yy] the potential of imaginary component of input signal.
3- the 2nd potential of real component of input signal.
4 2nd potential of imaginary component of input signal.
the 1st potential of real component of output signal is 5th.
6 1st potential of imaginary component of output signal.
7 2nd potential of real component of output signal.
the 2nd potential of imaginary component of output signal is eighth.

PARAMETERS:
1 scale.

4.3. FACHH - Calculation of the amplitude - frequency characteristic in the decibels

NAME: Calculation of the amplitude - frequency characteristic in the decibels.

FIELD OF APPLICATION : Frequency response analysis. Electronics.

DEGREES OF FREEDOM:
1 1st potential of real component of input signal.
2-1 - [yy] the potential of imaginary component of input signal.
3- the 2nd potential of real component of input signal.
4 2nd potential of imaginary component of input signal.
the 1st potential of real component of output signal is 5th.
6 1st potential of imaginary component of output signal.
7 2nd potential of real component of output signal.
the 2nd potential of imaginary component of output signal is eighth.

PARAMETERS:
1 coefficient N = 5, 10, 15…