

GEORGE MICROS

ECE 313 ELECTRONICS

CONTRACTION FUNCTION FOR VOLTAGE ACROSS DIODE

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clear; clc

% CIRCUIT CONDITIONS
Vdd = 5; %V
R = 1000; %Ohms
Vt = .0259; %V

%INITIAL CONDITIONS
I = .001; %A
Vdiode = .7; %V

Is = I*exp(-Vdiode/Vt);
Vdiode = zeros(10);

%INITIAL GUESS VECTOR
guess = [10 -5 .2];

%ITERATION THROUGH GUESS VECTOR
for j = 1:length(guess)
    Vdiode(1) = guess(j);
    Idiode(1) = (Vdd - Vdiode(1))/R;
    fprintf('\n\nInitial guess : Vdiode = %f V, ', Vdiode(1));
    fprintf('    Idiode = %f A\n\n', Idiode(1));
    for i = 2:10
        %ITERATION USING CONTRACTION FUNCTION
        Vdiode(i) = Vt * abs(log((Vdd-Vdiode(i-1))/(Is*R)));
        fprintf('UPDATED: Vdiode = %f V', Vdiode(i))
        Idiode(i) = (Vdd - Vdiode(i))/R;
        fprintf('Initial guess : Idiode = %f A\n', Idiode(i));
    end
end

Initial guess : Vdiode = 10.000000 V,    Idiode = -0.005000 A

UPDATED: Vdiode = 0.746134 VInitial guess : Idiode = 0.004254 A
UPDATED: Vdiode = 0.737499 VInitial guess : Idiode = 0.004263 A
UPDATED: Vdiode = 0.737551 VInitial guess : Idiode = 0.004262 A
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UPDATED: Vdiode = 0.737551 VInitial guess : Idiode = 0.004262 A
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Initial guess : Vdiode = -5.000000 V, Idiode = 0.010000 A

UPDATED: Vdiode = 0.759637 VInitial guess : Idiode = 0.004240 A
 UPDATED: Vdiode = 0.737416 VInitial guess : Idiode = 0.004263 A
 UPDATED: Vdiode = 0.737552 VInitial guess : Idiode = 0.004262 A
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Initial guess : Vdiode = 0.200000 V, Idiode = 0.004800 A

UPDATED: Vdiode = 0.740627 VInitial guess : Idiode = 0.004259 A
 UPDATED: Vdiode = 0.737532 VInitial guess : Idiode = 0.004262 A
 UPDATED: Vdiode = 0.737551 VInitial guess : Idiode = 0.004262 A
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