A Review On Set Of Radioactive Decay Differential Equations Using Dtmethod and using Scilab

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Abstract :
It has been done to solve a radio decay differential equations set with starting conditions using DTM techniques and Scilab scripts. For the constant the variation of with the t displayed the greater values of N(t) that's a dependent variable. The decay in the case of λ are substantially greater than those in the case of t, according to the analysis of this work. Every Scilab code has been successfully produced.

Keywords : Scilab, Scilab codes, and Radio decay differential equations.

Introduction :

In the present world mathematical modelling will play an important rule and Differntial transforms can be used in various ways such as sovling some physical problems . The differntail transform method is the best tool to find solution for many scientific and engineering problems [1-4. The use of differnatil transforms was very vast to solve the problems as ordinary differential equations, partial differential equations, integral equations etc. In a physical system the differential equations have been solved by a number of differentail transforms.

Now a days, high demand for Scilab software due to its user-friendly as well as can be to obtain in a feasible way from a variety of sources. There is no need for a significant amount of space on the hard-drive in order to install it. Researchers, academicians, engineers, and technicians working in industry all use it. It is also used in all subfields of engineering.
It also has installation distinguishability, means that even if there are numerous variations of the operating systems Linux, Mac, and Windows available on the market, neither the Windows nor the Mac versions may be installed on the former. The Windows version of this program is the only one that can be installed. The same is available for checking and downloading on its website, www.scilab.org. You may do out mathematical calculations using Scilab. Since we are aware that electrons may interfere, M. Karalic et al. [1] conducted research on how they behave similarly to water, sound, and light waves. Scilab and Matlab are quite similar in that they both have extensive applications and may be used for modeling and simulation. The several operations outcomes on graphs, linear equations, several mathematical operations, and higher-level applications have been discovered to be comparable. A few RK-4-based differential equations using the computing program Matlab. Very significant Scilab tools are often utilized in modeling or simulation to carry out or run the program. Matlab has used numerical methods to describe and resolve the ordinary differential equation utilizing the Highly Enhanced Euler's approach. Scilab, it might be said, has several uses. Ordinary differential equations may be easily solved using their numerical application.

Differential Transform Method (DTM) :

The basic definitions and fundamental operations of the one-dimensional differential transform are defined as follows, Let $f(x)$ be an analytic function in the real numbers, and let $x0$ be a real number. The function $f(x)$ is then represented by one series whose center is located at $x0$. The differential transform of the function $f(x)$ is of the form:

$$F(k) = \frac{1}{k!}\left[\frac{d^k f(x)}{d x^k}\right] \qquad (1)$$

Main results :

The assumption that the process of radioactive decay, that is, the transformation of a nucleus parent into a nucleus of a daughter, is an entirely statistical one is the foundation of the radioactive decay fundamental law. The probability of disintegration, often known as decay, is an essential quality of an atomic nucleus that is unchanging over the course of time:
Where, N is denoted as of radioactive nuclei number, -dN/dt the decrease (negative) of this number per Unit of time and λ denoted as the probability of decay per nucleus per unit of time. This decay
The constant λ is specific for every mode of decay mode of every nuclide.

Consider the successive radioactive decay equations linear differential equation of the form

$$\frac{dN}{dt} = -\lambda N \quad \text{...} \quad (2)$$

The above equations solution by Laplace transform represented as;

$$N(t) = N(0)\ e^{-\lambda t} \quad \text{...} \quad (3)$$

Consider the equation (1) and applying DTmethod . with initial conditions N(0)=4, $\lambda = 1.1$. on the interval of time [0,5].
then equation (2) is reduce to
Using the definition of DTmethod ,

$$N_k^{DTM}(t) = \sum_{k=0}^{k} N(k).t^k$$ when k takes the value k=6.

$$N_6^{DTM}(t) = N(0)t^0 + N(1)t^1 + N(2)t^2 + N(3)t^3 + N(4)t^4 + N(5)t^5 + N(6)t^6 + ---$$

$$N(t) = 4.e^{-(1.1)t} \quad \text{...} (4)$$

$$N(k+1) = \frac{-1}{(k+1)}(1.1)N(k).$$

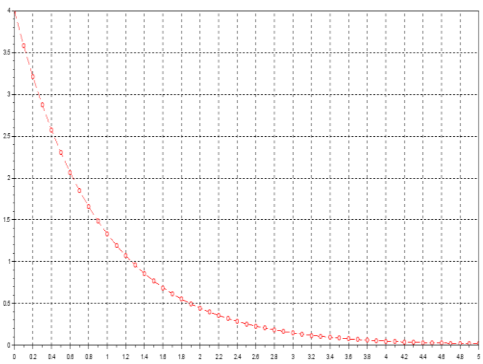
We have
k=0, N(1)=-4.4
k=1, N(2)=2.42
k=2, N(3)=-0.88733.
k=3, N(4)=0.19521.
k=4, N(5)=-0.03578.
K=5, N(6)=6.56122x10^{-3}.

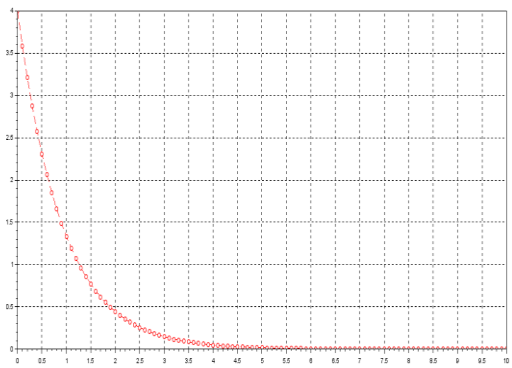
Table 1.1 .

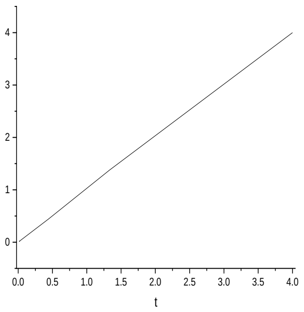
Values of t	N(t)	N(t) Using R-K method	Absolute errors	Using DTmetod
0	4	4	0	-4.4
1	1.331484	1.376712	0.045228	2.42
2	0.443212	0.443685	0.000473	-0.88733
3	0.147532	0.148526	0.000994	0.19521
4	0.049109	0.050103	0.000995	-0.035788
5	0.016342	0.016387	4.5x10^{-5}	6.5632x10^{-3}
6	0.021253	0.021458	5.8x10^{-6}	7.8561x10^{-6}

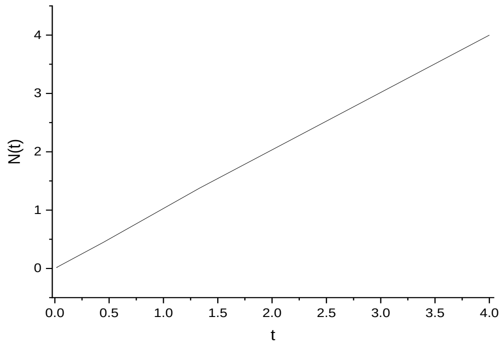
Sci lab codes :

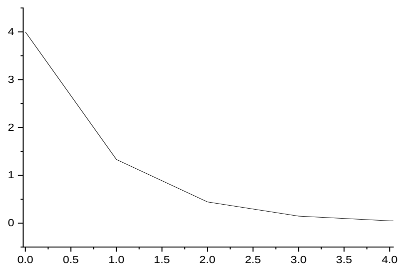
```
clc;
clear;
clf;
//To solve radio active differential equation //
lambda=1.1;
function Ndash=f(t, N)
Ndash=-lambda*N
endfunction
t=[0:0.1:10]
t0=0
N0=100
N=ode(N0,t0,t,N)
plot(t,N,'--or')
tgrid(1,1,3)
```

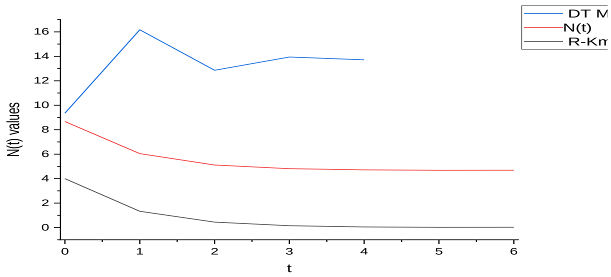












Conclusion:

In this article, we investigate both the computational treatment and the Scilab codes for the differential equations solution involving radioactive decay. Both the values and the amount of time have been played around with and the graphs have been plotted using Scilab.

after conducting this analysis, we have come to the conclusion that these plots include highly important data that depend on the decay element. When λ is constant, the greater for N(0) is observed in comparison to the t for the plot of t & N having t. A comparisen study is also

made with R-K method and DTmethod and also ploted the graphs with respect to time t.

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