MODERN METHODS AND APPLICATIONS OF TEACHING THE SCIENCE OF DIFFERENTIAL EQUATIONS

[1]Abdullayev Otabek Karimberdiyevich, [2]Eshmirzayev Shokhjakhan Shodiyorovich
[1,2]Muhammad al- Khorazmi Tashkent Information Technologies University
https://doi.org/10.5281/zenodo.11080122

Abstract*. This in the article immutable coefficient second in order one sexual differential equations analytical solve methods using Maple math from the package using, solve, obviously practical in matters this the process show the issue of solving algorithm and program Create in the eye caught.*

Keywords*: immutable coefficient, the second in order one sexual differential equation mathematician package, maple, dissolve, method.*

INTRODUCTION

Modern in education of the computer application from the fields one mechanic processes and of objects mathematician models count methods and of computers software tools using research reach being remains Calculation mathematics methods and of computers modern possibilities together mechanic processes and objects that's it until then unknown features to open and that's it technologically processes to improve service is doing

Current science and technology per day developed increasingly of mathematics role increased is going Including from mathematics physics, mechanics and astronomy and economic issues in solution, biological processes analysis in reaching and another a lot in the fields is used. In these areas of processes mathematician model differential equations name with is conducted.

METHODOLOGY

This scientific article count mathematics and of the computer scientific research at work to be used depends is scientific and practical in terms of is relevant [4]. In the article immutable coefficient second in order one sexual differential equations using the Maple program analytical and approx. solve issue is considered. Below of the matter put and him of solving consecutively algorithm given. Immutable coefficient second in order one sexual differential equations solve for necessary has been count methods is described.

DISCUSSION AND RESULTS

In practice optional mathematician package using done increase possible "elementary" calculations and substitutions chain complicated solving problems too enable gives (e.g. simple differential equations, limit issues solving). Maple software package of mathematics special in departments many of issues solutions to find possibility will give . In the Maple environment work technology with special in the literature get to know possible [5-6]. Maple math from the package " Differential equations " and " High from mathematics to be practical in classes, in seminar classes, simple differential equation and equations system, borderline issues numerous solve according to selection sciences in training use can

This at work immutable coefficient second in order one sexual differential of Eqs solve method let's look at [1-3]. to us the following linear differential equation given let it be

this on the ground

$$y'' + py' + qy = 0$$

p, q - immutable number (1)

to Eq with a constant coefficient second in order one sexual differentialequation is called This equation for characteristic competition as usual will be

$$k^2 \square pk \square q \square 0 \ (2)$$

Immutable coefficient differential of Eqs the solution characteristic equation to the roots depends will be Immutable coefficient second in order one sexual differential equation characteristic equation (2) in appearance square equation will be

Square the equation properties according to the following three in case let's look.

1. Characteristic square the equation discriminant positive ie $D>0$ U without

(2) characteristic equation two different k_1 v a k real to the roots have will be This 2

in case (1) a second -order homogeneous differential with constant coefficients of Eq the solution the following in appearance will be

$$y(x) \square c_1 e^{k_1 x} \square c_2 e^{k_2 x}$$

2. Characteristic square the equation discriminant to zero equal ie $D=0$.U

in case (2) characteristic equation *k is* two multiples to the root have will be in this case (1) immutable coefficient second immutable k in order one sexual differential of Eq the solution the following in appearance will be

$$y(x) \square (c_1 \square c_2 x) e^{kx}$$

3. Characteristic square the equation discriminant Minus ie $D \square 0$. SHE IS without (2) characteristic equation real to the root have it won't be . (2) equation complex

the root have will be ie $k_{1.2} \square \square \square i \square$.

This without (1) with a constant coefficient second in order one sexual differential of Eq the solution the following in appearancewill be

$y(x) \square e^{\square x}(c_1 \cos \square x \square c_2$ without $\square x)$

Seeing developed three condition easily table in the form of present to be done can

Immutable coefficient second in order one sexual differential of Eq common the solution		
Characteristic the equation roots	Characteristicthe equation discriminant	General solution
two different k_1 and k_2 h a qiq i y to the roots have	$D>0$	$y(x)=c_1e^{k_1x}+c_2e^{k_2x}$
k two multiple to the root have	$D=0$	$y(x)=(c_1+c_2x)e^{kx}$

complex to the root have will beie k $i\ 1.2=\pm\alpha\beta$	$D<0$	$y(x)=e^{\alpha x}(c_1\cos\beta x+c_2\sin\beta x)$

Second in order one sexual differential Maple equation package using common the solution and Koshi the issue the solution graph to describe circle examples let's look .

Example 1. y′′ +4y′ +3y =0, y(0) =1, y ′(0) =1 cos the issue take off

Solution :

$$> ode_1 := y''(x) + 4\cdot y'(x) + 3\cdot y(x) = 0 :$$

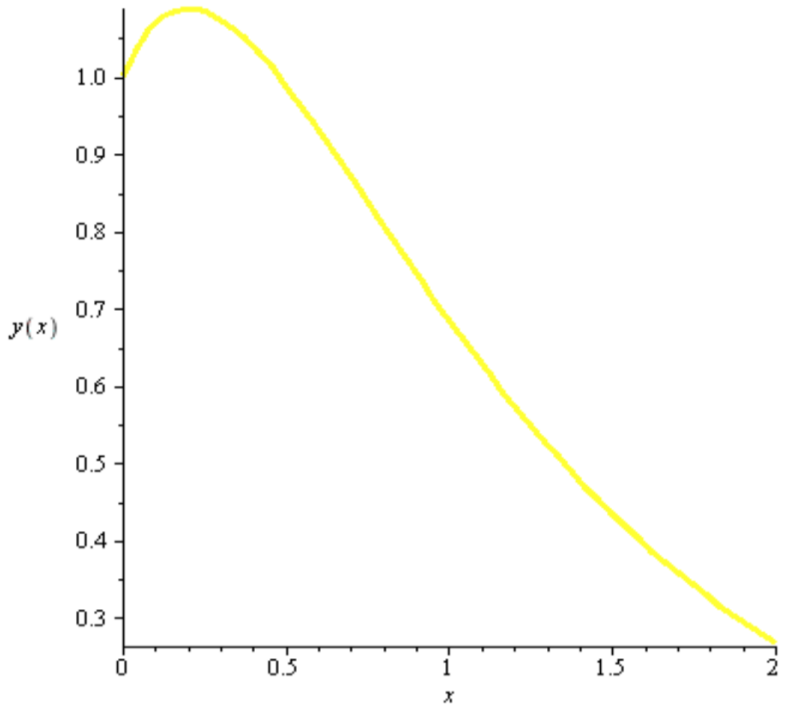
$$> sol_1 := dsolve(ode_1, useInt)$$

$$sol_1 := y(x) = \_C1\, e^{-x} + \_C2\, e^{-3x}$$

$$> DE1 := \left(\frac{d^2}{dx^2} y(x)\right) + 4\left(\frac{d}{dx} y(x)\right) + 3\cdot y(x) = 0$$

$$> DEplot(DE1, y(x), x = 0..2, [[y(0) = 1, D(y)(0) = 1]])$$

$$DE1 := \frac{d^2}{dx^2} y(x) + 4\left(\frac{d}{dx} y(x)\right) + 3\, y(x) = 0$$



Example 2. *y*′′ +6 *years*′ +9 *y* =0, *y* (−1) =0, *y* ′(−1) =2 square the issue take off

Solution :

$$> ode_2 := y''(x) + 6\cdot y'(x) + 9\cdot y(x) = 0 :$$

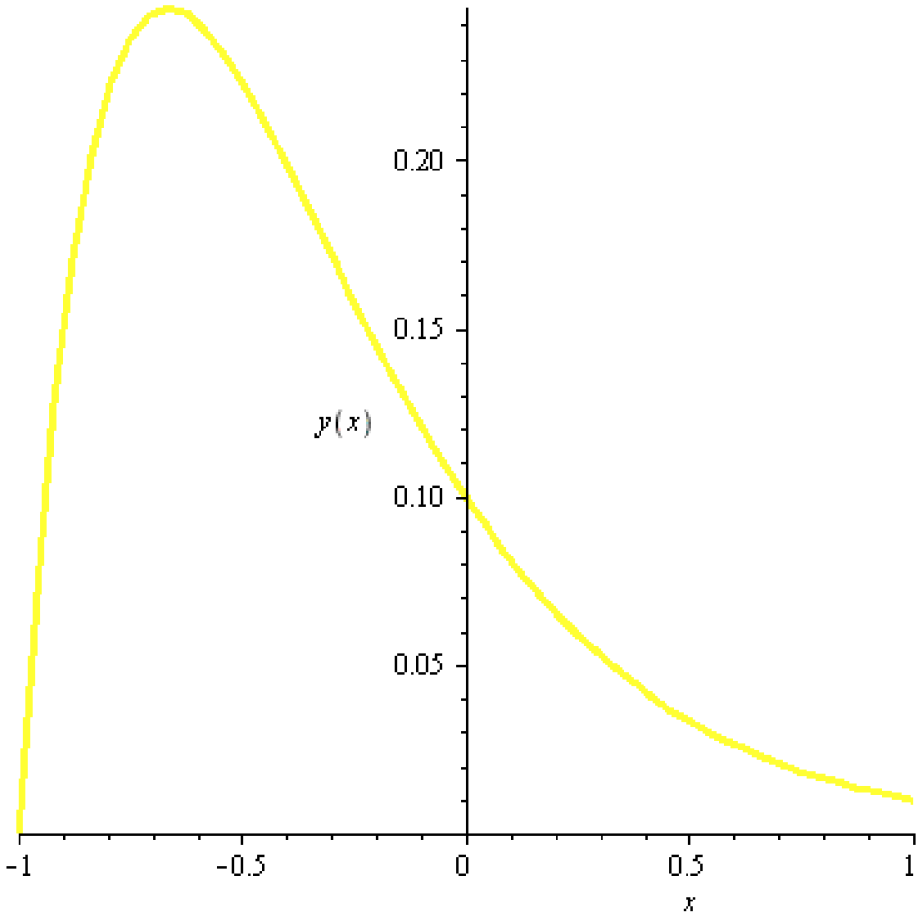
$$> sol_2 := dsolve(ode_2, useInt)$$

$$sol_2 := y(x) = \_C1\, e^{-3x} + \_C2\, e^{-3x} x$$

$$> DE2 := \left(\frac{d^2}{dx^2} y(x)\right) + 6\cdot\left(\frac{d}{dx} y(x)\right) + 9\cdot y(x) = 0$$

$$> DEplot(DE2, y(x), x = -1..1, [[y(-1) = 0, D(y)(-1) = 2]])$$

$$DE2 := \frac{d^2}{dx^2} y(x) + 6\left(\frac{d}{dx} y(x)\right) + 9\, y(x) = 0$$



CONCLUSION

If this such as Immutable coefficient second in order one sexual differential equations issues simple mathematician method solve , and his graph harvest to do necessary if it is from

students , scientific employee and from teachers a lot time and qualification Demand is enough Above from the issue apparently as it is I n the Maple environment easy solve and one at the time his graph too harvest to do possible it is

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