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**Dispersion Relation Equation
of Shallow Water**

**Solution of Fisher's Equation
Using Integral Iterative Method**

**Covid-19 and Political Crisis
Effects on Risk Minimising
Portfolios**

**Determinants
of Graduate
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**Applications of Institutionistic Fuzzy Analytic
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MATHEMATICS IN APPLIED RESEARCH

BULETIN RASMI
KOLEJ PENGAJIAN PENGKOMPUTERAN,
INFORMATIK, DAN MEDIA, UITM CAWANGAN
NEGERI SEMBILAN KAMPUS SEREMBAN
EDISI NOVEMBER 2022

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Disamping itu, pihak KPPIM Seremban mengharapkan makalah ini akan menjadi rujukan dan pemangkin kepada usaha menghasilkan penyelidikan Projek Tahun Akhir yang lebih bermutu tinggi. Makalah ini juga adalah batu asas kepada perkongsian penyelidikan terkini daripada pelajar dan pensyarah KPPIM Seremban.

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- Dr. Nor Azni Shahari

semoga kecemerlangan perkhidmatan yang ditunjukkan oleh kedua editor-editor ini akan menjadi pendorong kepada editorial board yang seterusnya. Sekian. Terima kasih.

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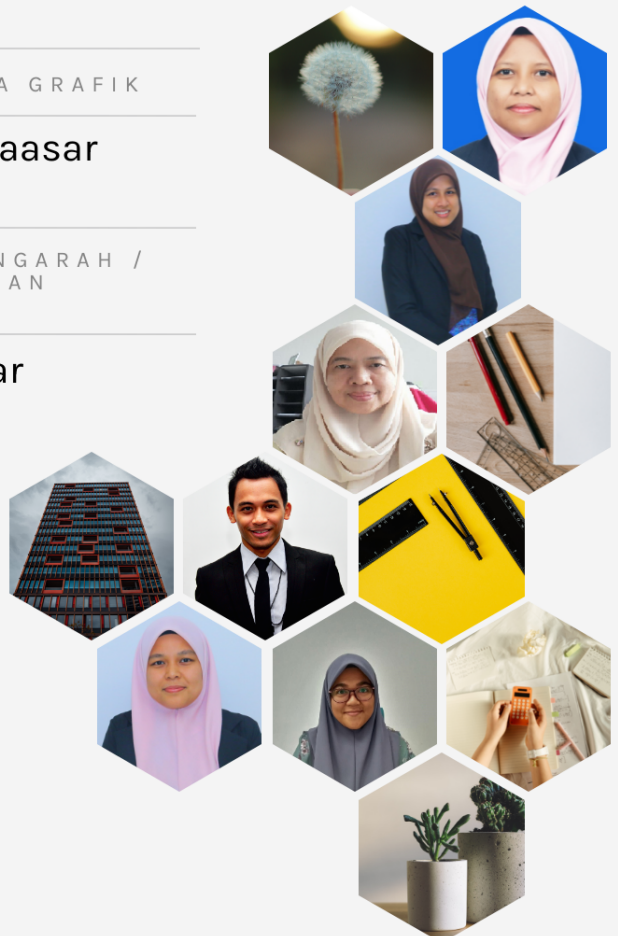
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for being with us,



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Dr. Nur Azlina
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MiAR 2021, 2022

for all the dedications and

Happy Retirement

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TEMIMI AND ANSARI METHOD FOR SOLVING QUADRATIC RICCATI DIFFERENTIAL EQUATION

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1. The Main Text

In this study, a quadratic Riccati equation is solved by using the Temimi and Ansari method (TAM)(Temimi and Ansari, 2011). The Riccati equation is a class of nonlinear differential equation and play important role in various fields in sciences and engineering. The quadratic Riccati equation is given as the following form (Ghomanjani and Khorram, 2017):

$$u'(x) = p(x) + q(x)u(x) + r(x)u^2(x). \quad 0 \leq x \leq 1, \tag{1}$$

with the initial condition,

$$u(0) = \alpha \tag{2}$$

where $p(x)$, $q(x)$ and $r(x)$ are continuous, α is arbitrary constant and $u(x)$ is unknown function.

In this studied, we applied the TAM to approximate the solutions of quadratic Riccati equation.

2. The Temimi and Ansari Method

We begin by noting any differential equation

$$L(u(x)) + N(u(x)) + g(x) = 0 \tag{3}$$

with boundary conditions

$$B\left(u, \frac{du}{dx}\right) = 0 \tag{4}$$

where x denotes the independent variable, $u(x)$ is an unknown function, $g(x)$ is known function, L is a linear operator, N is a nonlinear operator and B is a boundary operator.

By assuming that $u_0(x)$ is an initial guess to solve the problem $u(x)$ and the solution begin by solving the initial value problem:

$$L(u_0(x)) + g(x) = 0, \quad \text{and} \quad B\left(u_0, \frac{du_0}{dx}\right) = 0. \tag{5}$$

The next iteration is:

$$L(u_1(x)) + N(u_0(x)) + g(x) = 0 \quad \text{and} \quad B\left(u_1, \frac{du_1}{dx}\right) = 0. \tag{6}$$

Thus, we have the general iterative procedure which is the solution of a set of problems i.e.,

$$L(u_{n+1}(x)) + N(u_n(x)) + g(x) = 0 \quad \text{and} \quad B\left(u_{n+1}, \frac{du_{n+1}}{dx}\right) = 0. \tag{7}$$

Then, the solution for problem (3) with boundary condition (4) is given by

$$u(x) = \lim_{n \rightarrow \infty} u_n(x). \tag{8}$$

3. Numerical Examples

We applied the TAM to quadratics Riccati equation as follows:

$$u'(x) = 16x^2 - 5 + 8xu(x) + u^2(x) \quad \text{with} \quad u(0) = 1 \tag{9}$$

where the exact solution was found to be of the form

$$u(x) = 1 - 4x \tag{10}$$

The graphs of approximated $u_4(x)$ and exact solution are plotted in Figure 1.

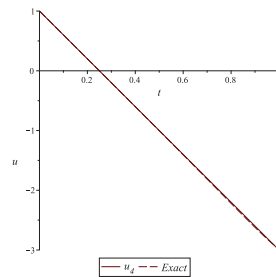


Figure 1: The graphs of approximated $u_4(x)$ and exact solution

Table 1 show the error between $u_4(x)$ with the exact solution. The error at $x = 1$ is in magnitude 10^{-3} , indicate the accuracy of the method.

Table 1: Error values of $u(x)$

x	Error of present method
0	0.
0.1	0.00000129950748408
0.2	0.00003982379927917
0.3	0.00028466541939227
0.4	0.00110927146177403
0.5	0.00306816548745478
0.6	0.00674309997432418
0.7	0.01236881688910242
0.8	0.01887932341083779
0.9	0.02051575606612077
1.0	0.01354436603605038

4. Conclusion

TAM was applied to solve a quadratic Riccati equation. The accuracy analysis show that TAM has a potential as a tool to solve the nonlinear differential equation.

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