Journal of Quality Measurement and Analysis *JQMA* 21(1) 2025, 195-205
e-ISSN: 2600-8602 *http://www.ukm.my/jqma*
https://doi.org/10.17576/jqma.2101.2025.12

A NEW MODIFIED COMPACT FINITE DIFFERENCE SCHEME FOR SOLVING THE GENERALIZED BURGERS-HUXLEY EQUATION IN TEACHING AND LEARNING PROCESSES

(Skema Diubah Suai Baru Beza Terhingga Padat untuk Menyelesaikan Persamaan Burgers-Huxley Teritlak dalam Proses Pengajaran dan Pembelajaran)

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ABSTRACT

In this study, a new modified scheme based on compact finite difference technique has been proposed for approximate the solution of the generalized Burgers-Huxley equation. The basic idea of compact finite difference scheme is to find the compact approximations to the derivatives terms by manipulating the governing equation. This basic concept is suitable to be introduced in teaching and learning processes for the Generalized Burgers – Huxley equation. The numerical experiments on the proposed scheme have been conducted and all the computations were carried out by MATLAB R2010a software. The results are compared with analytical solutions and the solution obtained by other researchers. Encouraging results have been obtained. Comparative study shows that the compact finite difference scheme produces better accuracy than the scheme cited in the literature. The compact finite difference scheme exhibits reliable method for solving the generalized Burgers-Huxley equation.

Keywords: compact finite difference scheme; generalized Burgers-Huxley equation; accuracy

ABSTRAK

Dalam kajian ini, satu skema diubah suai baru yang berdasarkan teknik beza terhingga padat telah dicadangkan untuk mendapatkan penghampiran penyelesaian bagi persamaan Burgers-Huxley teritlak. Idea asas skema beza terhingga padat adalah untuk mencari penghampiran padat bagi terma-terma pembezaan dengan memanipulasi persamaan pengawal. Konsep asas ini sesuai diperkenalkan di dalam proses pengajaran dan pembelajaran untuk persamaan Burgers-Huxley teritlak. Ujikaji berangka ke atas skema yang dicadangkan telah dijalankan dan semua pengiraan dilakukan menggunakan perisian MATLAB R2010a. Hasil yang diperoleh dibandingkan dengan penyelesaian analitik dan penyelesaian yang diperoleh oleh penyelidik lain. Hasil yang menggalakkan telah diperoleh. Kajian perbandingan menunjukkan bahawa skema beza terhingga padat menghasilkan ketepatan yang lebih baik berbanding skema didalam kajian literatur. Skema beza terhingga padat menunjukkan kaedah yang boleh dipercayai untuk menyelesaikan persamaan Burgers-Huxley teritlak.

Kata kunci: skema beza terhingga padat; persamaan Burgers-Huxley teritlak; kejituan

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Received: 4 November 2024
Accepted: 29 December 2024

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