SOLVING ORDINARY DIFFERENTIAL EQUATION BY USING EULER'S METHOD AND ITS VARIANT BASED ON MATLAB GUI

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ABSTRACT

Euler's method is one of the most basic and simplest explicit methods to solve first-order ordinary differential equations (ODEs). The simplest approach for estimating initial value issues' solutions is Euler's method. The so-called "enhanced polygon method" or "modified Euler technique," which enables a more accurate approximation of the answer, is another approach that is more helpful in numerical issues. Nowadays, it is vital and efficient to use numerical methods to obtain a rough solution to differential equations. The Euler strategy is the simplest, not just of all the methods, for estimating the solution to the initial value problem. The main objectives are to review the development of Euler's method using bibliometric analysis and to develop a GUI for IVP ODE using Euler's method and some of its variants. The study of solving ODE via Euler's method and its variant is applied to the process of building a GUI function in MATLAB. The literature review for the Euler's method and ODEs was produced in the second step using the bibliometric analysis. The results of solving ODEs using Euler's method and its variant based on GUI-MATLAB are then shown to determine which approach the most effective method based on the Mean Square Error and Computation time that generate from data of GUI-MATLAB on step size 0.1, 0.2, 0.5. The Runge-Kutta order 4 method, the Euler method, ODE23tb, and ODE23s had the lowest MSE and took the least amount of time to solve ODE problems.

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