

**ZMATH 2015d.00790**

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**A fourth-order Runge-Kutta (RK4) spreadsheet calculator for solving a system of two first-order ordinary differential equations using Visual Basic (VBA) programming.**

Spreadsheets Educ. 8, No. 1, 9 p., electronic only (2014).

Summary: Motivated by the work of a spreadsheet solution of a system of ordinary differential equations (ODEs) using the fourth-order Runge-Kutta (RK4) method, a RK4 spreadsheet calculator for solving a system of two first-order ODEs was developed using VBA programming. The main feature of this spreadsheet calculator is to provide a user-friendly interface input form for users to insert the required information instead of the standard cells in Excel. Users are prompted step by step to give relevant information beginning from providing independent and dependent variables used in the system of ODEs. Secondly, they are required to give the interval for the independent variable, initial values for the dependent variables, a step size and desired accuracy for computation. Thirdly, they have to enter the system of two first-order ODEs and the exact functions if it exists. The ODEs and the exact function can be typed in mathematical form. After Solve button is clicked, its calculation is automatically performed and can be recalculated for a new system once the needed information is re-entered. The attached spreadsheet calculator together with this paper would be able to assist educators in preparing their marking scheme easily and help students to verify their answers. A summative evaluation of this RK4 Spreadsheet Calculator has been conducted by involving 34 students as sample. The data was collected using questionnaire. The findings showed that majority of the students agreed that the RK4 Spreadsheet Calculator provides a learning environment that allows learners to be guided through the solution which is presented step by step.

*Classification:* I75 M55 U75 N45

*Keywords:* differential equations; teaching; spreadsheets; systems of ordinary differential equations; fourth-order Runge-Kutta (RK4) method; spreadsheet calculator; numerical solution; mathematical applications; network circuits

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