



# Block Methods for Special Second Order Ordinary Differential Equations: Sequential and Parallel Implementations

*Yap Lee Ken, Fudziah Ismail, Mohamed Suleiman*

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Various types of methods have been developed for solving the special second order ODEs which is not explicitly dependent on the first derivative of the solution. The solution to the equation can be obtained by reducing it to an equivalent first order system of twice the dimension and solved using a standard numerical methods. However it is often advantageous to solve them directly. This book focused on the derivation of the block methods for solving the special second order ODEs directly. The early section of the book is devoted to the derivation of the methods using linear operator. Then the derivation of the method is done using Newton-Gregory backward interpolation formula. Numerical results of the methods are compared with the existing methods which shows that they are computationally more efficient. Block methods are suitable for parallel implementation, hence parallel codes of the methods are developed for solving large systems of ODEs. The performance of the methods using sequential and parallel codes are compared which clearly shows that the parallel codes produced better speedup and efficiency.

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