

On the simple iteration method for non-linear ordinary differential equations

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Abstract

This paper presents a new iterative approach for solving non-linear differential equations with fluid mechanics applications. The proposed method, called Simple Iteration Method (SIM), is based on the formulation of an iteration scheme using ideas imported from fixed point iteration method. An advantage of the proposed method is that convergence is guaranteed for non-linear differential equations with polynomial non-linearity, such as those that model some fluid flows. The method does not employ linearisation and thus avoids errors associated with truncating series expansions. The applicability, effectiveness and validity of the SIM has been demonstrated on several examples of well-known fluid flow model equations. Accuracy and convergence analysis has also been conducted in this work. Mathematics Subject Classification (2010). 80M22 (primary), 78M22 (secondary).