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Study and Solving High Complex Non-Linear Differential Equations Applied in the Engineering Field by Analytical New Approach AGM

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Abstract : In this paper, three complicated nonlinear differential equations(PDE,ODE) in the field of engineering and non-vibration have been analyzed and solved completely by new method that we have named it Akbari-Ganji's Method (AGM) . As regards the previous published papers, investigating this kind of equations is a very hard task to do and the obtained solution is not accurate and reliable. This issue will be emerged after comparing the achieved solutions by Numerical Method. Based on the comparisons which have been made between the gained solutions by AGM and Numerical Method (Runge-Kutta 4th), it is possible to indicate that AGM can be successfully applied for various differential equations particularly for difficult ones. Furthermore, It is necessary to mention that a summary of the excellence of this method in comparison with the other approaches can be considered as follows: It is noteworthy that these results have been indicated that this approach is very effective and easy therefore it can be applied for other kinds of nonlinear equations, And also the reasons of selecting the mentioned method for solving differential equations in a wide variety of fields not only in vibrations but also in different fields of sciences such as fluid mechanics, solid mechanics, chemical engineering, etc. Therefore, a solution with high precision will be acquired. With regard to the afore-mentioned explanations, the process of solving nonlinear equation(s) will be very easy and convenient in comparison with the other methods. And also one of the important position that is explored in this paper is: Trigonometric and exponential terms in the differential equation (the method AGM) , is no need to use Taylor series Expansion to enhance the precision of the result.

Keywords : new method (AGM), complex non-linear partial differential equations, damping ratio, energy lost per cycle
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