

## Investigation a New Approach "AGM" to Solve of Complicate Nonlinear Partial Differential Equations at All Engineering Field and Basic Science

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**Abstract :** In this conference, our aims are accuracy, capabilities and power at solving of the complicated non-linear partial differential. Our purpose is to enhance the ability to solve the mentioned nonlinear differential equations at basic science and engineering field and similar issues with a simple and innovative approach. As we know most of engineering system behavior in practical are nonlinear process (especially basic science and engineering field, etc.) and analytical solving (no numeric) these problems are difficult, complex, and sometimes impossible like (Fluids and Gas wave, these problems can't solve with numeric method, because of no have boundary condition) accordingly in this symposium we are going to exposure an innovative approach which we have named it Akbari-Ganji's Method or AGM in engineering, that can solve sets of coupled nonlinear differential equations (ODE, PDE) with high accuracy and simple solution and so this issue will emerge after comparing the achieved solutions by Numerical method (Runge-Kutta 4th). Eventually, AGM method will be proved that could be created huge evolution for researchers, professors and students in whole over the world, because of AGM coding system, so by using this software we can analytically solve all complicated linear and nonlinear partial differential equations, with help of that there is no difficulty for solving all nonlinear differential equations. Advantages and ability of this method (AGM) as follow: (a) Non-linear Differential equations (ODE, PDE) are directly solvable by this method. (b) In this method (AGM), most of the time, without any dimensionless procedure, we can solve equation(s) by any boundary or initial condition number. (c) AGM method always is convergent in boundary or initial condition. (d) Parameters of exponential, Trigonometric and Logarithmic of the existent in the non-linear differential equation with AGM method no needs Taylor expand which are caused high solve precision. (e) AGM method is very flexible in the coding system, and can solve easily varieties of the non-linear differential equation at high acceptable accuracy. (f) One of the important advantages of this method is analytical solving with high accuracy such as partial differential equation in vibration in solids, waves in water and gas, with minimum initial and boundary condition capable to solve problem. (g) It is very important to present a general and simple approach for solving most problems of the differential equations with high non-linearity in engineering sciences especially at civil engineering, and compare output with numerical method (Runge-Kutta 4th) and Exact solutions.

**Keywords :** new approach, AGM, sets of coupled nonlinear differential equation, exact solutions, numerical

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