**Open Journal of Applied Sciences, 2016, 6, 287-297**
Published Online April 2016 in SciRes. http://www.scirp.org/journal/ojapps
http://dx.doi.org/10.4236/ojapps.2016.64028

# Mean Square Solutions of Second-Order Random Differential Equations by Using the Differential Transformation Method

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Received 21 March 2016; accepted 25 April 2016; published 28 April 2016



## Abstract

**The differential transformation method (DTM) is applied to solve the second-order random differential equations. Several examples are represented to demonstrate the effectiveness of the proposed method. The results show that DTM is an efficient and accurate technique for finding exact and approximate solutions.**

## Keywords

**Random Differential Equations, Stochastic Differential Equation, Differential Transformation Method**

## 1. Introduction

The ordinary differential equations which contain random constant or random variables are well known topics which are called the random ordinary differential equations. The subject of second-order random differential equations is one of much current interests due to the great importance of many applications in engineering, biology and physical phenomena (see, e.g. Chil'es and Delfiner [1], Cort'es *et al*. [2], Soong [3] and references therein). Recently, several first-order random differential models have been solved by using the Mean Square Calculus [2] [4]-[11]. Variety scientific problems have been modeled by using the nonlinear second-order random differential equations. However, most of these equations cannot be solved analytically. Thus, accurate and efficient numerical techniques are needed. There are several semi-numerical techniques which have been considered to obtain exact and approximate solutions of linear and nonlinear differential equations, such as adomian decomposition method (ADM) [12], variational iteration method (VIM) [13] and homotopy perturbation method (HPM) [14]. We observe that semi-numerical methods are very prevalent in the current literature, cf. [12]-[14].

The object of this work is to describe how to implement the differential transformation method (DTM) for

**How to cite this paper:** Khudair, A.R., Haddad, S.A.M. and Khalaf, S.L. (2016) Mean Square Solutions of Second-Order Random Differential Equations by Using the Differential Transformation Method. *Open Journal of Applied Sciences*, **6**, 287-297.
http://dx.doi.org/10.4236/ojapps.2016.64028