Dedication

This research is dedication with love and affection
To my parents,
My brothers and my sister

Acknowledgements

Weeping may endure for a night but joy comes in the morning. I thank the Almighty God for His unprecedented love and grace upon me .I would like to express my sincere gratitude to the Sudan university of science and technology (SUST) for granting me this wonderful opportunity to do a high graduate studies (MSc) in mathematical science .A million thanks to Academy of engineering Science for making Academy of engineering Science a global reality .My loving Kindness goes to my parents, brothers and my sister .I would like to give especial appreciation to my supervisor Dr. **Mohamed Hassan Mohamed Khabir** for his steadfast love , guidance and support in making this research a success . I love you all and I pray that you guys will always be there fore me. On love!!

Abstract

In this thesis we present the homotopy perturbation method (HPM). We applied it for solving some differential and integral equations (linear and nonlinear). The HPM is a coupling of the traditional perturbation method and homotopy in topology. This method doesn't require a small parameter in an equations. It method provides an analytical approximate solution for the differential equations. We also present a modification of The homotopy perturbation method. and apply it also for solving linear and nonlinear differential equations. The modified HPM accelerates the rapid convergence of the series solution. The modification provides the exact solution by using only minimal number of iteration and improve the performance of the standard HPM .

الخلاصة

في هذا البحث نقدم طريقة الاضطراب الهموتوبية (HPM) وتطبيقاتها لحل بعض المعادلات التفاضلية والتكاملية (الخطية والغير خطية) وهي اقتران لطريقتين، طريقة الاضطراب التقليدية وطريقة الهموتوبي في الطوبولوجيا .هذه الطريقة لا تحتاج لوسيط في المعادلة, وهي تعطي حلا تحليليا تقريبا للمعادلات التفاضلية . كما تناولنا ايضا طريقة الاضطراب الهموتوبية المعدلة وتطبيقها من اجل حل المعادلات التفاضلية الخطية وغير الخطية , وهي طريقة تسرع تقارب الحل في اقل خطوات تكرارية وتعتبر تحسينا لطريقة الاضطراب الهموتوبية (HPM).

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