Modelling childhood diseases in the presence of a preventive vaccine: Application of Adomian decomposition technique

O. D. Makinde
Applied Mathematics Department, University of Limpopo, Private Bag X1106, Sovenga 0727, South Africa (makindeo@ul.ac.za)

Abstract

Over the years, diligent vaccination campaigns have resulted in high levels of permanent immunity against the childhood disease among the population, e.g. measles, mumps, chicken pox, etc. In this article, a SIR model that monitors the temporal dynamics of a childhood disease in the presence of preventive vaccine is developed. The qualitative analysis reveals the vaccination reproductive number for disease control and eradication. Adomian decomposition method is also employed to compute an approximation to the solution of the nonlinear system of differential equations governing the problem. Graphical results are presented and discussed quantitatively to illustrate the solution.

Keywords: Epidemic models; Constant vaccination strategy; Stability analysis; Adomian decomposition technique.

References