Solution of a one-dimensional heat equation with axial symmetry via Laplace Adomian decomposition method

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Abstract:
This paper deals with the application of Laplace transform combined with Adomian Decomposition Method. The method is hereby referred to as LADM for finding an analytical solution of a one-dimensional heat model with axial symmetry. The exact forms of the solutions are obtained with ease using the proposed method (LADM)

I. Introduction

Axial Symmetries (ASs) are transformations that are isometric in nature as they preserve distances between their points and the corresponding image reflections (homologous), though with inverse orientation. The axial symmetry occurs when the points of an object coincide with the points of another one. Most differential models (equations) are associated with symmetries [1 , 2] . In this work, a source-less heat model describing one-dimensional unsteady thermal processes with axial symmetry will be considered as follows:

$$\begin{cases} \partial w/\partial t=\beta\gamma\partial/\partial\gamma(\gamma\partial w/\partial\gamma) \\ w(\gamma,0)=h(\gamma) \end{cases} \quad (1.1)$$