Combination of integral and projected differential transform methods for time-fractional gas dynamics equations

ABSTRACT

The present paper discusses the solution of nonlinear homogeneous and nonhomogeneous time-fractional gas dynamic equations arising in shock fronts by a new combination of new integral and projected differential transform method. The new integral projected differential transform method (NIPDTM) makes the calculation very simpler and in this method the nonlinear term can be easily handled by projected differential transform without using Adomian's polynomial and He's polynomial, which can be taken as a big advantage of this method. This method is more exertive and easy to handle such fractional differential equation in comparison to other methods. The results obtain from illustrative examples shows the competency and accordance of the proposed method.

Keyword: New integral transform method; Projected differential transform method; Time-fractional gas dynamic equation; Caputo fractional derivative; Mittag-Leffler function