

Solution of propagation of acoustic-gravity waves in the atmosphere using finite difference method of order two

A. Setvati-Zirak¹, S.H. Momeni-Masuleh^{*1}, H.R. Massah²

1. Department of Mathematics, Shahed University

2. Acoustical Engineering Society of Iran

Abstract

Investigating waves propagation's equation in the atmosphere is one of the important and widely used issues in various sciences, which has attracted many researchers. A type of propagating waves is an acoustic-gravity wave. These type of waves have a lot of stationarity properties and can be propagate to a high altitude in the atmosphere. The equation of acoustic-gravity wave propagation is a hyperbolic nonlinear hydrodynamic equation consisting of continuity, motion, and energy equations. To obtain the solution of the acoustic-gravity waves propagation equation, the related hydrodynamic equations are written in the form of a conservation equation. In the next step, the propagation of the acoustic-gravity wave is simulated in the atmosphere using a two-stage Lax-Wendroff method, which is a finite difference method with a second order accuracy in place and time.

Keywords: Acoustic-gravity waves, Atmosphere, Tow-stage Lax-Wendroff, Finite difference, Hyperbolic equation.

pp. 12-20 (In Persian)

* Corresponding author E-mail: momeni@shahed.ac.ir