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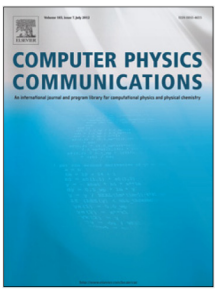

Simulation of the pulse propagation by the interacting mode parabolic equation method

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Simulation of the pulse propagation by the interacting mode parabolic equation method

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Abstract

A broadband modeling of pulses has been performed by using the previously derived interacting mode parabolic equation through the Fourier synthesis. Test examples on the wedge with the angle 2.86° (known as the ASA benchmark) show excellent agreement with the source images method.

Keywords: parabolic equation method, multiple-scale method, normal mode, pulse propagation
PACS: 43.30.Bp, 43.30.Cq, 43.20.Bi

1. Introduction

Interest in developing effective methods for calculating broadband acoustic signals in three-dimensional inhomogeneous media has recently increased. It should be noted that calculations of this kind require significant computational resources. For example, in Westwood's work, ray methods were used to calculate broadband signals in the geometry of a permeable-bottom wedge [1, 2]. F. Sturm used a three-dimensional wide-angle parabolic equation in combination with the Fourier synthesis of broadband pulses [3, 4].

So it is of interest to adapt results of our paper [5] to modeling propagation of broadband signals.

In the present paper we use mode representation of the field together with the parabolic equation describing the mode propagation (this method is known as the method of the mode parabolic equation). For a representation

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