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# A stability analysis for a generalized finite-difference scheme applied to the pure advection equation

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## Abstract

This paper deals with a stability analysis for a finite-difference approximation of the pure advection equation which is solved on non-rectangular regions using convex and logically rectangular grids. The analysis is derived as a natural extension to that of the Lax-Wendroff and Lax-Friedrichs schemes for the same kind of regions.

**Keywords:** stability analysis, finite-difference, advection equation, irregular regions, numerical solution of EDP's

**2016 MSC:** 65M06, 65M22

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## 1. Introduction

The general problem of this article is to discuss the stability of a finite-difference approximation to the solution of the well posed problem

$$\frac{\partial u}{\partial t} + a \frac{\partial u}{\partial x} + b \frac{\partial u}{\partial y} = 0 \quad \Omega \times [0, T] \quad a, b \in \mathbb{R},$$

$$u(x, y, 0) = g(x, y) \quad (x, y) \in \Omega,$$

$$u(x, y, t)|_{S_1} = h(x, y, t) \quad (x, y) \in \Omega \quad t \in [0, T],$$

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