On the Hyers-Ulam Stability of Certain Partial Differential Equations of Second Order

Emel Biçer [1] and Cemil Tunç [2*]

[1] *Department of Mathematics, Faculty of Arts and Sciences, Bingöl University, 12000, Bingöl, Turkey*
[2] *Department of Mathematics, Faculty of Sciences, Yuzuncu Yil University, 65080, Van, Turkey*

Abstract: In this paper, we obtain two new results on the Hyers-Ulam stability of the linear partial differential equation of second order with constant coefficients

$$Az_{xx} + (A + B)z_{xy} + Bz_{yy} + Az_x + Bz_y = 0$$

and the partial Euler differential equation of the form

$$x^2 z_{xx} + 2xy z_{xy} + y^2 z_{yy} + mx z_x + my z_y - mz = 0.$$

Our findings make a contribution to the topic and complete those in the relevant literature.

Keywords: *partial differential equation; Hyers-Ulam stability; second order.*

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1 Introduction

The stability theory is an important research area in the qualitative analysis of differential equations and partial differential equations. It follows from the relevant literature that the investigation of the Hyers-Ulam and Hyers-Ulam-Rassias stability of equations with partial derivatives started recently. We should mention the earliest results on the topic or some results obtained for the linear partial differential equations of first or second order by Alsina and Ger [1], Cimpean and Popa [2], Gordji et al. [3], Hyers [4], Jung ([5], [6], [7], [8]), Li and Huang [9], Liu and Zhao [10], Lungu and Popa ([11], [12]), Rassias

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