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HYERS STABILITY OF AQC FUNCTIONAL EQUATION

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Abstract. The Ulam stability theorem has been used in numerous functional equations to investigate the stability when a particular functional equation is approximated in Banach spaces, Banach Algebra, and so on. The purpose of this research is to investigate the generalised Hyers-Ulam-Rassias stability in the approximation of the following AQC - mixed type functional equation in Banach space.

Keywords. AQC functional equation, generalized Ulam - Hyers stability, Banach spaces.

AMS (MOS) subject classification: 39B52, 39B82.

1 Introduction

Many branches of mathematics use functional equations, including statistics, mechanics, geometry, measure theory and group theory. Those fascinating applications of functional equations in probability theory are the characteristics of the various problems which exist. Functional equation solutions can be used to characterise the joint distributions that is derived from conditional distributions. The origin of stability for functional equation is started in the year 1940 related with a question of Ulam [1]. The historical study of stability of functional equations one can see [2, 3, 4, 5].
J.M. Rassias [6] discovered the solution and Ulam stability of the mixed type additive and cubic functional equation of the form

$$\begin{aligned} &3\mathscr{F}(x+y+z)+\mathscr{F}(-x+y+z)+\mathscr{F}(x-y+z)+\mathscr{F}(x+y-z)\\ &\quad+4\left[\mathscr{F}(x)+\mathscr{F}(y)+\mathscr{F}(z)\right]=4\left[\mathscr{F}(x+y)+\mathscr{F}(x+z)+\mathscr{F}(y+z)\right] \end{aligned} \tag{1.1}$$