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Hyers-Ulam stability of the Generalized Trigonometric Formulas

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Abstract: In this paper, we will investigate the Hyers-Ulam stability of the following functional equations

$$\int_G \int_K f(xtk \cdot y) dk d\mu(t) = f(x)g(y) + g(x)f(y), \quad x, y \in G$$

and

$$\int_G \int_K f(xtk \cdot y) dk d\mu(t) = f(x)f(y) - g(x)g(y), \quad x, y \in G,$$

where K is a compact subgroup of morphisms of G , dk is a normalized Haar measure of K , μ is a complex K -invariant measure with compact support,

the functions f, g are continuous on G and f is assumed to satisfies the

Kannappan type condition $K(\mu)$

$$\int_G \int_G f(ztxsy) d\mu(t) d\mu(s) = \int_G \int_G f(ztysx) d\mu(t) d\mu(s), \quad x, y, z \in G.$$

The paper of Székelyhidi [30] is the essential motivation for the present work and the methods used here are closely related to and inspired by those in [30]. The concept of the generalized Hyers-Ulam stability of mappings was introduced in the subject of functional equations by Th. M. Rassias in [20].



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