Additive functional equations and partial multipliers in $C^*$-algebras. (English) Zbl 1435.46038

Summary: In this paper, we solve the additive functional equations
\begin{align}
  f(x+y+z) - f(x+y) - f(z) &= s(f(x+y-z) + f(x-y+z) - 2f(x)) \quad (1) \\
  f(x+y-z) + f(x-y+z) - 2f(x) &= s(f(x+y+z) - f(x+y) - f(z)), \quad (2)
\end{align}
where $s$ is a fixed nonzero complex number.

Furthermore, we prove the Hyers-Ulam stability of the additive functional equations (1) and (2) in complex Banach spaces. This is applied to investigate partial multipliers in Banach $*$-algebras, unital $C^*$-algebras, Lie $C^*$-algebras, $JC^*$-algebras and $C^*$-ternary algebras, associated with the additive functional equations (1) and (2).

MSC:
- 46L05 General theory of $C^*$-algebras
- 43A22 Homomorphisms and multipliers of function spaces on groups, semi-groups, etc.
- 39B52 Functional equations for functions with more general domains and/or ranges
- 39B62 Functional inequalities, including subadditivity, convexity, etc.

Keywords:
- partial multiplier; $C^*$-algebra; Hyers-Ulam stability; additive functional equation; $C^*$-ternary algebra; Lie $C^*$-algebra; $JC^*$-algebra

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References:


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