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Perturbation of Closed Range Operators

Mohammad Sal MOSLEHIAN[1,2], Ghadir SADEGHI[1,2]

[1]Department of Pure Mathematics,
Ferdowsi University of Mashhad, P. O. Box
1159, Mashhad 91775, IRAN
e-mail: moslehian@ferdowsi.um.ac.ir and moslehian@ams.org

[2]Center of Excellence in Analysis
on Algebraic Structures (CEAAS),
Ferdowsi University of
Mashhad-IRAN
e-mail: ghadir54@yahoo.com

Abstract: Let T, A be operators with domains $D(T) \subseteq D(A)$ in a normed space X. The operator A is called T-bounded if $\|Ax\| \leq a\|x\| + b\|Tx\|$ for some $a, b \geq 0$ and all $x \in D(T)$. If A has the Hyers--Ulam stability then under some suitable assumptions we show that both T and S: = A+T have the Hyers--Ulam stability. We also discuss the best constant of Hyers--Ulam stability for the operator S. Thus we establish a link between T-bounded operators and Hyers--Ulam stability.

Key Words: Hilbert space; perturbation; Hyers--Ulam stability; closed operator; semi-Fredholm operator.