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On the injective norm and characterization of some subclasses of normal operators by inequalities or equalities

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Abstract
Let B (H) be the C*-algebra of all bounded linear operators acting on a complex Hilbert space H. In this note, we shall show that if S is an invertible normal operator in B (H) the following estimation holds{norm of matrix} S ⊗ S-1 + S-1 ⊗ S {norm of matrix}λ ≤ {norm of matrix} S {norm of matrix} {norm of matrix} S-1 {norm of matrix} + frac(1, {norm of matrix} S {norm of matrix} {norm of matrix} S-1 {norm of matrix}) where {norm of matrix} . {norm of matrix}λ is the injective norm on the tensor product B (H) ⊗ B (H). This last inequality becomes an equality when S is invertible self-adjoint. On the other hand, we shall characterize the set of all invertible normal operators S in B (H) satisfying the relation{norm of matrix} S ⊗ S-1 + S-1 ⊗ S {norm of matrix}λ = {norm of matrix} S {norm of matrix} {norm of matrix} S-1 {norm of matrix} + frac(1, {norm of matrix} S {norm of matrix} {norm of matrix} S-1 {norm of matrix}) and also we shall give some characterizations of some subclasses of normal operators in B (H) by inequalities or equalities.

Author Keywords
Injective norm; Normal operator; Self-adjoint operator; Tensor product space; Unitary operator

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