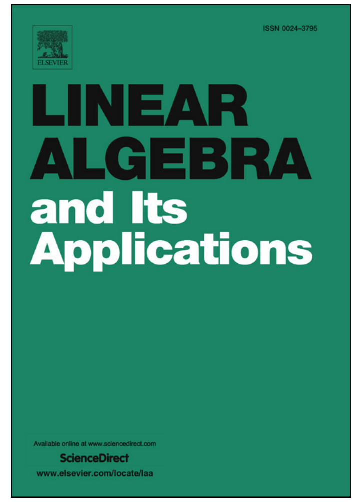

A spectral radius inequality for sums of operators with an application to the problem of bounding the zeros of polynomials

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A SPECTRAL RADIUS INEQUALITY FOR SUMS OF OPERATORS WITH AN APPLICATION TO THE PROBLEM OF BOUNDING THE ZEROS OF POLYNOMIALS

AMER ABU-OMAR

Abstract. We prove spectral radius inequalities for sums of operators. Our results are employed to establish a new bound for the zeros of polynomials.

1. Introduction

In this article, $B(H)$ denote the C^*-algebra of all bounded linear operators on a complex Hilbert space H. When H has a finite dimension n, we identify $B(H)$ with the algebra of all $n \times n$ complex matrices M_n. For $A \in B(H)$, let $r(A)$, $w(A)$, and $\|A\|$ denote the spectral radius, the numerical radius, and the operator norm of A, respectively. It is well-known that

$$\|A\| = \|A^* A\|^{1/2},$$

where A^* is the adjoint of A, and

$$r(A) \leq w(A) \leq \|A\|.$$

The equality $r(A) = \|A\|$ holds for a large class of operators containing the class of normal operators. Hence,

$$\|A\| = r^{1/2}(A^* A).$$

Also, it is a basic fact that

$$r(AB) = r(BA)$$

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