ON THE POWER BOUNDEDNESS OF CERTAIN VOLTERRA OPERATOR PENCILS

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Let V be the classical Volterra operator on $L^p(0,1)$, $1 \le p \le \infty$, and let z be a complex number. We prove the following results:

Theorem 1. *The operator $I - zV$ is power bounded on $L^2(0,1)$, if and only if $Rez \ge 0$ and $Imz = 0$.*

Corollary 1. *On $L^2(0,1)$, we have*

$$\|(I-V)^n - (I-V)^{n+1}\| = O(n^{-1/2}) \quad as \ = n \to \infty,$$

an improvement of Pytlik's estimation.

Theorem 2. *The operator $I - zV$, $z \in \mathbb{C}$ is power bounded on $L^1(0,1)$, if and only if $z = 0$.*

Theorem 3. *The operator $I - zV^2$, $z \in \mathbb{C}$ is power bounded on $L^p(0,1)$, $1 \le p \le \infty$, if and only if $z = 0$.*