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8. Analysis

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Rigidity of commutators and elementary operators on Calkin algebras

Let E be a Banach space, $\mathcal{C}(E) = L(E)/K(E)$ the Calkin algebra, and denote quotient elements by $s = S + K(E)$. Let $\mathcal{E}_{a,b} : s \mapsto \sum_{i=1}^{n} a_i s b_i$ stand for the *elementary operator* on $\mathcal{C}(E)$ induced by the n-tuples $A = (A_1, \ldots, A_n), B = (B_1, \ldots, B_n) \in L(E)^n$. The following strong rigidity results are presented for arbitrary n-tuples A and B: (i) if E has an unconditional Schauder basis, then $\mathrm{dist}(\mathcal{E}_{a,b}, K(\mathcal{C}(E))$ is uniformly comparable with $\|\mathcal{E}_{a,b}\|$ [1], (ii) $\mathcal{E}_{a,b}$ is injective on $\mathcal{C}(\ell^p)$ iff it is bounded below [2], (iii) $\mathcal{E}_{a,b}$ has dense range on $\mathcal{C}(\ell^p)$ iff it is surjective [2]. These results are joint work with E. Saksman.

References: [1] E. Saksman, and H. -O. Tylli, The Apostol-Fialkow formula for elementary operators on Banach spaces, (preprint, University of Helsinki, 1995). [2] E. Saksman, and H. -O. Tylli, Rigidity of commutators and elementary operators on Calkin algebras, Israel J. Math. (to appear).