

# BOUNDED APPROXIMATION PROPERTY OF PAIRS AND APPLICATIONS

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ABSTRACT. Let

$$0 \rightarrow Y \rightarrow X \rightarrow Z$$

be an exact sequence of Banach spaces, i.e.  $J$ -isomorphic embedding  $Q$ -surjection with  $\ker Q = J(Y)$ . Then (a) if  $X$  is an  $(L)_\infty$ -space and  $Y$  has BAP=the bounded approximation property (resp. UAP=the uniform approximation property) then  $Z$  has BAP (resp. UAP); (b) if  $X$  is an  $(L)_1$ -space and  $Z^*$  has BAP (resp.  $Z$  has UAP) then  $Y$  has BAP (resp. UAP).

Corollary: If  $G$  is a compact abelian group and  $S$  is a Sidon set in the dual group then the subspace of  $L^1(G)$  of all functions orthogonal to  $S$  (resp. the subspace of  $M(G)$  of all measures orthogonal to  $S$ ) has UAP.

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