

BED property for the tensor product of Banach algebras

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Abstract. Let \mathcal{A} and \mathcal{B} be commutative and semisimple Banach algebras. Suppose that $\|\cdot\|_\gamma$ is an algebra cross-norm on $\mathcal{A} \otimes \mathcal{B}$ such that $\|\cdot\|_\gamma \geq \|\cdot\|_e$, and $\mathcal{A} \widehat{\otimes}_\gamma \mathcal{B}$ is a semisimple Banach algebra. In this paper, we verify the BED property for $\mathcal{A} \widehat{\otimes}_\gamma \mathcal{B}$. In fact, we show that if $\mathcal{A} \widehat{\otimes}_\gamma \mathcal{B}$ is of BED, then both \mathcal{A} and \mathcal{B} are so, whenever either \mathcal{A} or \mathcal{B} is unital. We also show that if \mathcal{B} (resp., \mathcal{A}) is unital and $\widehat{\mathcal{A}} \subseteq C_{\text{BSE}}^0(\Delta(\mathcal{A}))$ (resp., $\widehat{\mathcal{B}} \subseteq C_{\text{BSE}}^0(\Delta(\mathcal{B}))$), then $\widehat{\mathcal{A} \widehat{\otimes}_\gamma \mathcal{B}} \subseteq C_{\text{BSE}}^0(\Delta(\mathcal{A} \widehat{\otimes}_\gamma \mathcal{B}))$. We also establish that if \mathcal{B} (resp., \mathcal{A}) is finite dimensional, then $\mathcal{A} \widehat{\otimes}_\gamma \mathcal{B}$ is of BED if and only if \mathcal{A} (resp., \mathcal{B}) is of BED.

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