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ON DERIVATIONS AND JORDAN DERIVATIONS THROUGH ZERO PRODUCTS

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Abstract. Let $\mathscr{A}$ be a unital complex (Banach) algebra and $\mathscr{M}$ be a unital (Banach) $\mathscr{A}$-bimodule. The main results describe (continuous) derivations or Jordan derivations $D:\mathscr{A}\to\mathscr{M}$ through the action on zero products, under certain conditions on $\mathscr{A}$ and $\mathscr{M}$. The proof is based on the consideration of a (continuous) bilinear map satisfying a related condition.

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REFERENCES

[1] J. Alaminos, M. Brešar, J. Extremera and A. R. Villena, *Characterizing homomorphisms and derivations on C^*-algebras*, Proc. R. Soc. Edinb. A **137** (2007), 1–7.
[2] J. Alaminos, M. Brešar, J. Extremera and A. R. Villena, *Maps preserving zero products*, Studia Math. 193 (2009), 131–159.
[3] J. Alaminos, M. M. Brešar, J. Extremera and A. R. Villena, *Characterizing Jordan maps on C^*-algebras through zero products*, Proc. Edinb. Math. Soc. **53** (2010), 543–555.
[4] M. Brešar, M. Grašić, J. S. Ortega, *Zero product determined matrix algebras*, Linear Algebra Appl. **430** (5/6) (2009), 1486–1498.
[5] M. Brešar, *Multiplication algebra and maps determined by zero products*, Linear and Multilinear Algebra, **60** (2012) 763–768.
[6] M. Burgos and J. S. Ortega, *On mappings preserving zero products*, Linear and Multilinear Algebra, 2012, in press.
[7] C. L. Chuang, T. K. Lee, *Derivations modulo elementary operators*, J. Algebra **338** (2011), 56–70.
[8] H. Ghahramani, *Additive mappings derivable at nontrivial idempotents on Banach algebras*, Linear and Multilinear Algebra, **60** (2012), 725–742.
[9] J. C. Hou and X. L. Zhang, *Ring isomorphisms and linear or additive maps preserving zero products on nest algebras*, Linear Algebra Appl. **387** (2004), 343–360.
[10] B. E. Johnson, *Symmetric amenability and the nonexistence of Lie and Jordan derivations*, Math. Proc. Cambd. Philos. Soc. **120** (1996), 455–473.
[11] C. Pearcy, D. Topping, *Sum of small numbers of idempotent*, Michigan Math. J. **14** (1967), 453–465.
[12] N. K. Spanoudakis, *Generalization of certain nest algebras results*, Proc. Amer. Math. Soc. **115** (1992), 711–723.

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