

ON NILPOTENT ELEMENTS

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This is recent work together with Esther García, Guillermo Vera and Rubén Muñoz ([1]). We give an inductive new proof of the Jordan canonical form of a nilpotent element in an arbitrary ring. If $a \in R$ is a nilpotent element of index n with von Neumann regular a^{n-1} , we decompose $a = ea + (1 - e)a$ with $ea \in eRe \cong \mathcal{M}_n(S)$ a Jordan block of size n over a corner S of R , and $(1 - e)a$ nilpotent of index $< n$ for an idempotent e of R commuting with a . This result makes it possible to characterize prime rings of bounded index n with a nilpotent element $a \in R$ of index n and von Neumann regular a^{n-1} as matrix rings over unital domains.

REFERENCES

- [1] A Jordan canonical form for nilpotent elements in an arbitrary ring, *Linear Algebra and its Applications* **581** (2019), 324–335.