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Title: GK-dimension of 2×2 generic Lie matrices

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Recently Machado and Koshlukov have computed the Gelfand–Kirillov dimension of the relatively free algebra $F_m = F_m(\mathrm{var}(sl_2(K)))$ of rank m in the variety of algebras generated by the three-dimensional simple Lie algebra $sl_2(K)$ over an infinite field K of characteristic different from 2. They have shown that $\mathrm{GKdim}(F_m) = 3(m-1)$. The algebra F_m is isomorphic to the Lie algebra generated by m generic 2×2 matrices. Now we give a new proof for $\mathrm{GKdim}(F_m)$ using classical results of Procesi and Razmyslov combined with the observation that the commutator ideal of F_m is a module of the center of the associative algebra generated by m generic traceless 2×2 matrices.

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