

Commuting matrix triples from jet schemes over the commuting pairs variety

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The k -th order jet scheme over a given variety X can be thought of as the set of all parameterized curves of degree k that vanish to degree at least k at some point on X . When X is the variety of commuting pairs of $n \times n$ matrices its k -th order jet scheme can also be interpreted as commuting pairs of $n(k+1) \times n(k+1)$ matrices that also commute with the matrix $J_{k+1} \oplus \cdots \oplus J_{k+1}$ (n summands), where J_{k+1} is the standard nilpotent $k+1 \times k+1$ Jordan block. We describe the structure of a distinguished open set of the k -th order jet scheme of X and explore the irreducibility of the jet scheme for small values of n . We draw inferences for the question of the dimension of the algebra generated by three commuting matrices.