Invariant theory in varieties of associative algebras

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Invariant theory deals with subalgebras of invariants of groups acting via algebra automorphisms on finitely generated algebras in the variety of commutative associative algebras. A natural context to develop *noncommutative* invariant theory is obtained by replacing the variety of commutative algebras by other varieties of associative algebras. The role of the commutative polynomial ring is then taken up by the relatively free algebras in the variety considered, and we are led to the study of the subalgebra of invariants of a group acting via linear substitutions of the generators of a relatively free algebra. Although some key results of commutative invariant theory about finite generation do not fully extend to this context, notable statements hold for certain varieties of associative algebras. In the talk we shall survey works in this direction, done in recent years in collaboration with Vesselin Drensky.