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Title: Representation theory and differential equations with polynomial solutions only.

Abstract: Let M be the tensor product of finite-dimensional representations of the Lie algebra gl_N. Representation theory allows us to construct a linear differential operator $D = \sum_{k=0}^{N}(-1)^k T_k(u)(d/du)^{N-k}$ whose coefficients $T_k(u) : M \to M$ are commuting linear operators on M called the Gaudin transfer matrices. It turns out that the kernel of this differential operator consists of polynomials only and the commutative algebra of its coefficients is related to the algebra of functions on the intersection of suitable Schubert cycles.