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Shuffle Products, Degenerate Affine Hecke Algebras, and Quantum Toda Lattice

We revisit an identification of the quantum Toda lattice for GL_N and the truncated shifted Yangian of $\mathfrak{sl}_2$, as well as related constructions, from a purely algebraic point of view, bypassing the topological medium of the homology of the affine Grassmannian. For instance, we interpret the Gerasimov-Kharchev-Lebedev-Oblezin homomorphism into the algebra of difference operators via a finite analog of the Miura transform. This algebraic identification is deduced by relating degenerate affine Hecke algebras to the simplest example of a rational Feigin-Odesskii shuffle product. As a bonus, we obtain a presentation of the latter via a mirabolic version of the Kostant-Whittaker reduction.