Q-systems and Generalizations in Representation Theory

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Tau functions given as matrix elements for the action of $\widehat{GL_2}$, the centrally extended loop group of GL_2, on two-component Fermionic Fock space satisfy an $A_{\infty/2}$ Q-system. It is then natural to ask what sort of discrete equations are satisfied by analogous tau functions given as matrix elements for the action of $\widehat{GL_3}$ on three-component Fermionic Fock space. In this talk, we will first define our $\widehat{GL_2}$ tau functions and explain how to show that they satisfy a Q-system. We will then define our $\widehat{GL_3}$ tau functions and describe the system of discrete equations that they satisfy. Since Q-systems are of interest in various areas of mathematics, we hope that our new system of equations will also have interesting applications. We will end this talk by discussing the progress we have made in finding these applications.