

Meeting: 1003, Atlanta, Georgia, SS 31A, AMS-SIAM Special Session on Integrable Systems and Special Functions, I

1003-39-54 **Michael Gekhtman** and **Alex Kasman*** (kasmana@cofc.edu), Department of Mathematics,
College of Charleston, Charleston, SC 29424. *On KP Generators and the Geometry of the HBDE.*

Sato theory provides a correspondence between solutions to the KP hierarchy and points in an infinite dimensional Grassmannian. In this correspondence, flows generated infinitesimally by powers of the “shift” operator give time dependence to the first coordinate of an arbitrarily selected point, making it a tau-function. These tau-functions satisfy a number of integrable equations, including the Hirota Bilinear Difference Equation (HBDE). I will explain how we can rederive the HBDE as a statement about linear maps between Grassmannians. In addition to illustrating the fundamental nature of this equation in the standard theory, we make use of this geometric interpretation of the HBDE to answer the question of what *other* infinitesimal generators could be used for similarly creating tau-functions. The answer to this question involves a “rank one condition”, tying this investigation to the large body of literature on integrable systems involving such conditions and providing an interpretation for their significance in terms of the relationship between the HBDE and the geometry of Grassmannians. (Received August 09, 2004)