

1117-35-54

**Alberto Bressan** and **Geng Chen\*** (gchen73@math.gatech.edu). *Lipschitz metric for variational wave equation.*

Abstract: The nonlinear wave equation:  $u_{tt} - c(u)[c(u)u_x]_x = 0$  is a natural generalization of the linear wave equation. In this talk, we will discuss a recent breakthrough addressing the Lipschitz continuous dependence of solutions on initial data for this quasi-linear wave equation. Our earlier results showed that this equation determines a unique flow of conservative solution within the natural energy space  $H^1(R)$ . However, this flow is not Lipschitz continuous with respect to the  $H^1$  distance, due to the formation of singularity. To prove the desired Lipschitz continuous property, we constructed a new Finsler type metric, where the norm of tangent vectors is defined in terms of an optimal transportation problem. For paths of piecewise smooth solutions, we carefully estimated how the distance grows in time. To complete the construction, we proved that the family of piecewise smooth solutions is dense, following by an application of Thom's transversality theorem. This is a collaboration work with Alberto Bressan. (Received December 28, 2015)