Asymptotic Stability of the Toda m-soliton

C. Eugene Wayne\(^*\), Aaron Hoffman\(^2\), and G. Nicholas Benes\(^3\)

\(^1\)Boston University – United States
\(^2\)Olin College of Engineering – United States
\(^3\)Image Insight Incorporated – United States

Abstract

We prove that multi-soliton solutions of the Toda lattice are both linearly and nonlin-early stable. Our proof uses neither the inverse spectral method nor the Lax pair of the model but instead studies the linearization of the Bäcklund transformation which links the \((m-1)\)-soliton solution to the \(m\)-soliton solution. We use this to construct a conjugation between the Toda flow linearized about an \(m\)-solition solution and the Toda flow linearized about the zero solution, whose stability properties can be determined by explicit calculation. This is joint work with Nick Benes and Aaron Hoffman.

\(^*\)Speaker