



Speaker: Zhijun (George) Qiao
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Tuesday, September 27, 2011
11:00 AM
258 Hurley Hall

Title: The DP hierarchy

Abstract:

In this talk, I will show how to find peakon solutions for the Degasperis–Procesi (DP) equation $m_t + m_x u + 3mu_x = 0$, $m = u - u_{xx}$. Our procedure shows that the DP equation either has cusp soliton and smooth soliton solutions only under the inhomogeneous boundary condition or possesses the regular peakon solutions in H_1 only under the homogeneous boundary condition. In particular, we first time obtain the stationary cuspon solution in $W^{\{1,1\}}_{loc}$ of the DP equation. Moreover we present new cusp solitons (in the space of $W^{\{1,1\}}_{loc}$) and smooth soliton solutions in an explicit form. Asymptotic analysis and numerical simulations are provided for smooth solitons and cusp solitons of the DP equation. Later on, I will show how to extend the DP equation to an integrable hierarchy through Lax pair procedure as well as presenting the parametric solution for the hierarchy.

References:

- Zhijun Qiao with Guoping Zhang (2007): Cuspons and Smooth Solitons of the Degasperis-Procesi Equation under Inhomogeneous Boundary Condition, *Mathematical Physics, Analysis and Geometry* 10, 205-225. (PDF file).
- Zhijun Qiao (2004): Integrable hierarchy (the DP hierarchy), 3 by 3 constrained systems, and parametric and stationary solutions, *Acta Applicandae Mathematicae* 83, 199-220. (PDF file).