Calderon-Zgymund Analysis Seminar

Monday, November 9, 3:45 pm

Title: Local Well-Posedness of the Kadomtsev-Petviashvili I Equations

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Abstract. We define the anisotropic Sobolev spaces as $H^{s_1,s_2}(M \times N) = \{g \in L^2(M \times N) : \|g\|_{H^{s_1,s_2}} = \|\widehat{g}(\xi,\eta)[(1+\xi^2)^{\frac{s_1}{2}} + (1+\eta^2)^{\frac{s_2}{2}}]\|_{L^2(M^* \times N^*)} < \infty\}$, where M or N can be either the real line $\mathbb{R}$ or the torus $\mathbb{T}$. We prove local well-posedness of modified KP-I equations in the KP hierarchy, namely for $\partial_t u + (-1)^{\frac{l+1}{2}} \partial_x^l u - \partial_x^{-1} \partial_y^2 u + u^2 \partial_x u = 0$ in the anisotropic Sobolev space $H^{s,0}(\mathbb{R} \times \mathbb{R})$ if $l = 3$ and $s > 2$, in $H^{s,s}(\mathbb{R} \times \mathbb{T})$ if $l = 3$ and $s > 2$, in $H^{s,s}(\mathbb{T} \times \mathbb{T})$ if $l = 3$ and $s > \frac{19}{8}$, and in $H^{s,s}(\mathbb{R} \times \mathbb{T})$ if $l = 5$ and $s > \frac{5}{2}$. All four results require the initial data to be small.