

***PDE, COMPLEX ANALYSIS AND  
DIFFERENTIAL GEOMETRY SEMINAR***

**Guest Speaker: Curtis Holliman**

**The Catholic University of America**

**Date:** Tuesday, July 11, 2017

**Time:** 2:00 PM

**Location:** 258 Hurley Hall

***Lecture Title:***

**Ill-posedness of Novikov's Equation**

***Abstract***

For the Novikov equation, we construct a 2-peakon solution with an asymmetric antipeakon-peakon initial profile whose  $H^s$ -norm for  $s < 3/2$  is arbitrarily small. Immediately after the initial time, both the antipeakon and peakon move in the positive direction, and a collision occurs in arbitrarily small time. Moreover, at the collision time the  $H^s$ -norm of the solution becomes arbitrarily large when  $5/4 < s < 3/2$ , thus resulting in norm inflation and ill-posedness. However, when  $s < 5/4$ , the solution at the collision time coincides with a second solitary antipeakon solution. This scenario thus results in nonuniqueness and ill-posedness. Finally, when  $s = 5/4$  ill-posedness follows either from a failure of convergence or a failure of uniqueness. Considering that the Novikov equation is well-posed for  $s > 3/2$ , these results put together establish  $3/2$  as the critical index of well-posedness for this equation.