

Department of Mathematics and Statistics
Colloquium Lecture Series

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**“We present the KdV!
It’s a non-linear PDE
With soliton solutions,
Which we find numerically.”**

–Small time solutions to the KdV equation using numerical methods–

The *Korteweg-de Vries Equation* (KdV) is famous as the prototypical example of an exactly solvable, non-linear, PDE. This is particularly impressive, because prior to the 1960’s very few classes of analytical solutions were known. Among these were classes of solitary wave solutions (*solitons*), characterized by non-dissipative propagation and non-linear interaction with each other. In the mid 1900’s interest in the KdV was reinvigorated with the advent of the computer, and early numerical experiments lent investigators greater intuition into the system’s behavior. At the same time, an infinite number of quantities which the KdV conserves were discovered, many of which were not preserved by the numerical schemes of the ‘60’s. Luckily for us in 2009, we have at our disposal such tools as the *Fast Fourier Transform*, *finite-volume schemes*, and recent results about *operator splitting* applied to the KdV. Many of these tools are at least as formally accurate as earlier schemes, and have the additional advantage of preserving desirable system features such as conserved quantities.

In this talk, we will discuss the history of the KdV and a comparison of numerical methods applied to it, which were investigated as part of a REU conducted at UAF during summer 2009. In a talk to follow, the *Inverse Scattering Transform* and its application to finding asymptotic KdV solutions will be discussed.

Thursday, November 5, 2009

Chapman 106

1:00–2:00

Refreshments after the talk in Chapman 101A