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The One Soliton Solution Under Noise
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Solving the Diffusion Equation
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Abstract

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$u_t + 6uu_x + u_{xxx} = \zeta(t)$

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We consider the one soliton solution of the KdV:

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So far, we have

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Therefore, the transform solution is

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Large Time Behavior of the Soliton Peak:

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Zabusky and Kruskal (1965) studied the KdV equation using the finite difference approximation [?]:

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We use discretized Brownian motion, where $W(t)$ is specified at discrete t values.

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[fontsize=] randn('state',100) T = 1; N = 500; dt = T/N; dW =
 sqrt(dt)*randn(1,N); W = cumsum(dW);



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The other identity to confirm is $\langle \exp(cW(t)) \rangle = \exp(\frac{1}{2} \langle W^2(t) \rangle)$.

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`mu=sqrt(2*eps) ;`



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Log(Amplitude) vs Log(Time)

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[baselinestretch=1,fontsize=] for count=1:runs for j=1:Tsteps

dW(i)=mu*sqrt(dt)*randn; end: for i=3:Tsteps for i=3:N-1

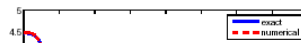
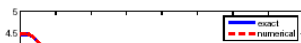


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[baselinestretch=1, fontsize=]

A=(spdiags(-2*ones(N1),1,N1,N1)+spdiags(ones(N1),2,N1,N1))

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500 runs for $\varepsilon = 1$ and $\eta = 2$

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$\mu=0.1$ and $\nu=0.11$

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$\epsilon=0.1$ and $\gamma=0.1$. 2000 Runs]

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When two solitons collide, they interact elastically. The exact solution for the two soliton equation is given by



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