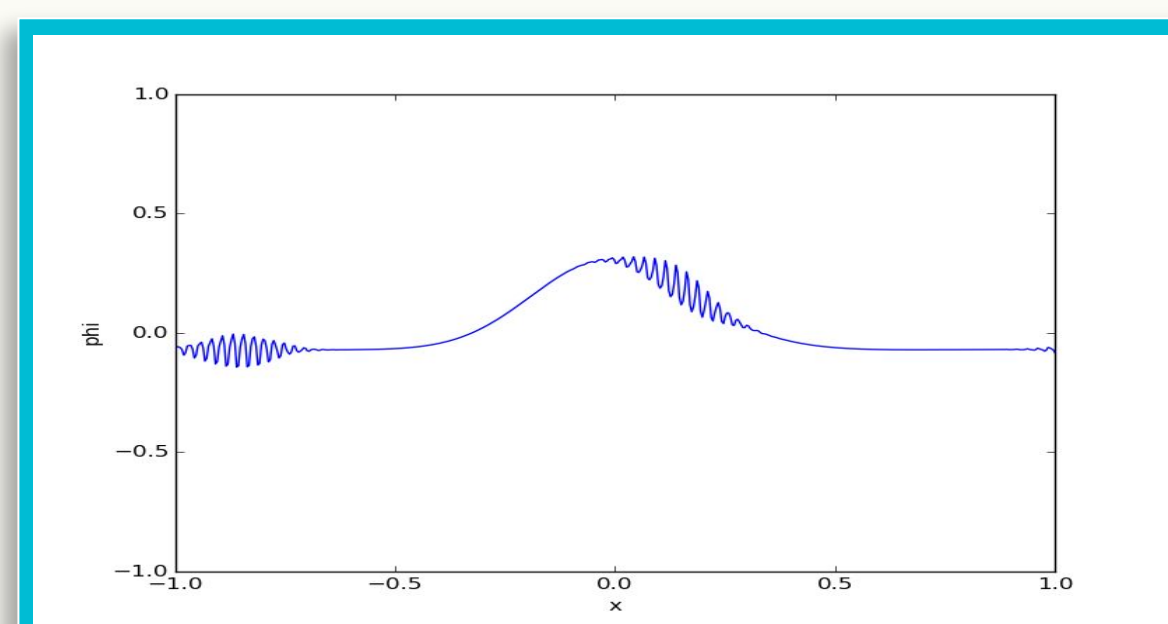


Concept

Localization has been found in various linear disordered media

Numerical study of localization in linear and nonlinear wave equations with random potentials

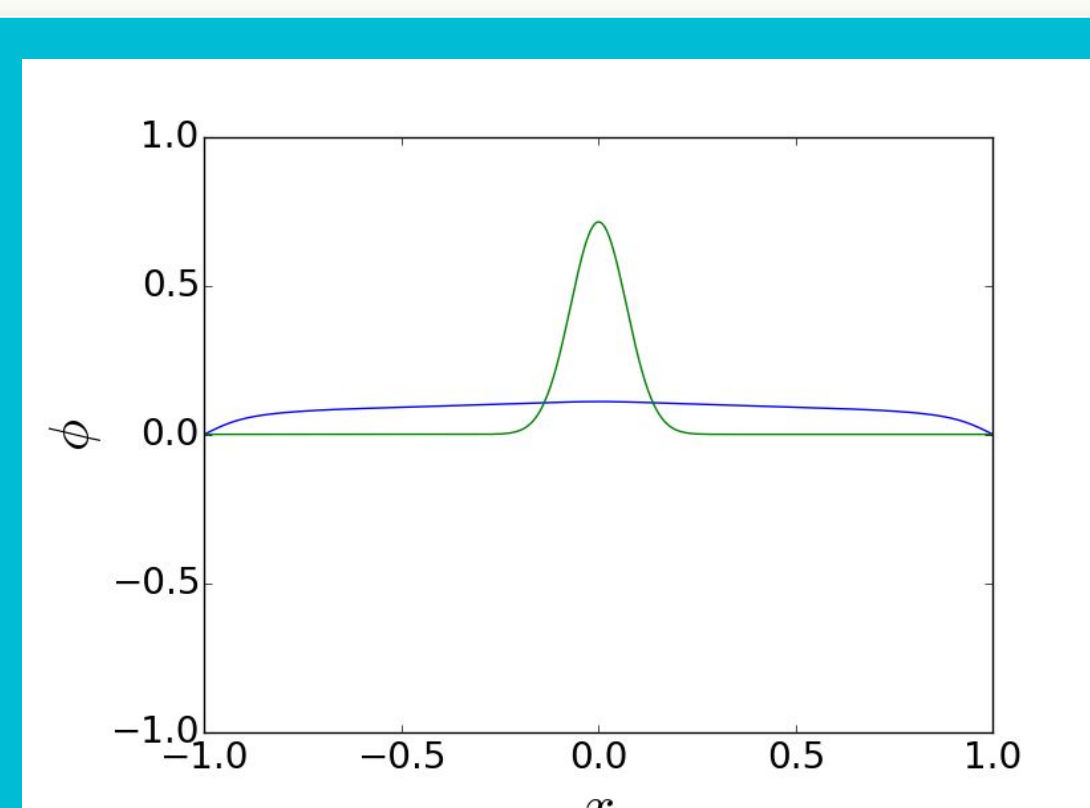
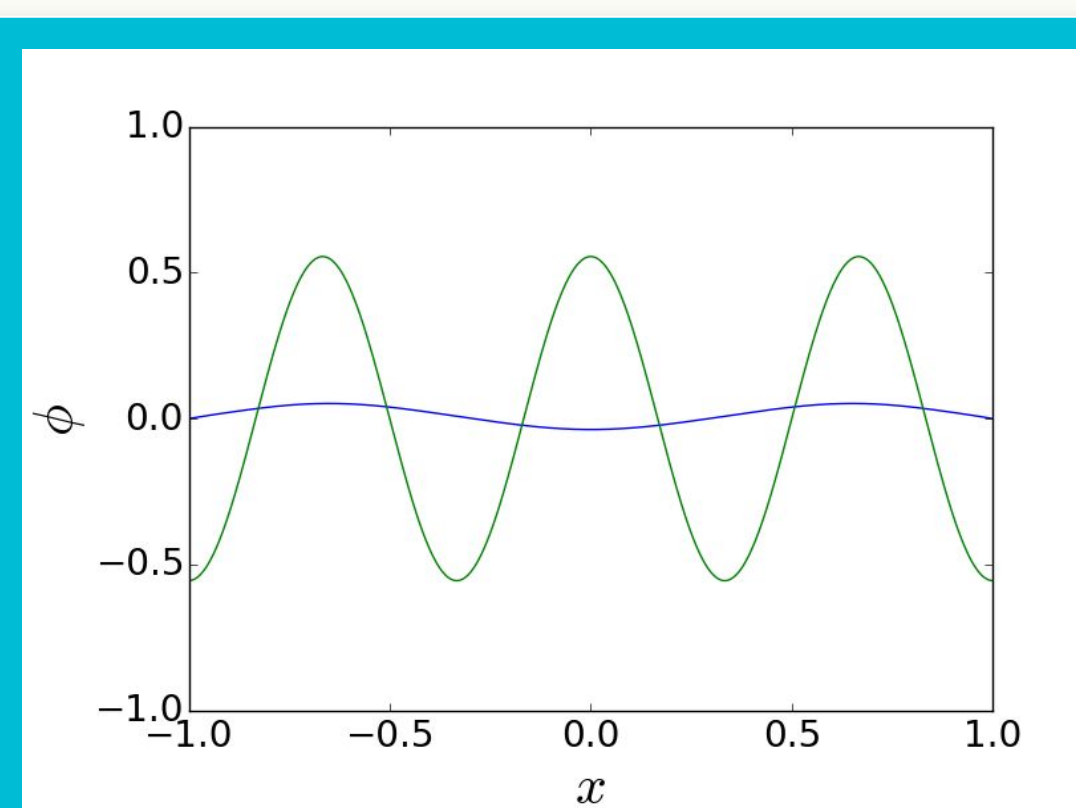
Numerical solutions are sometimes unstable



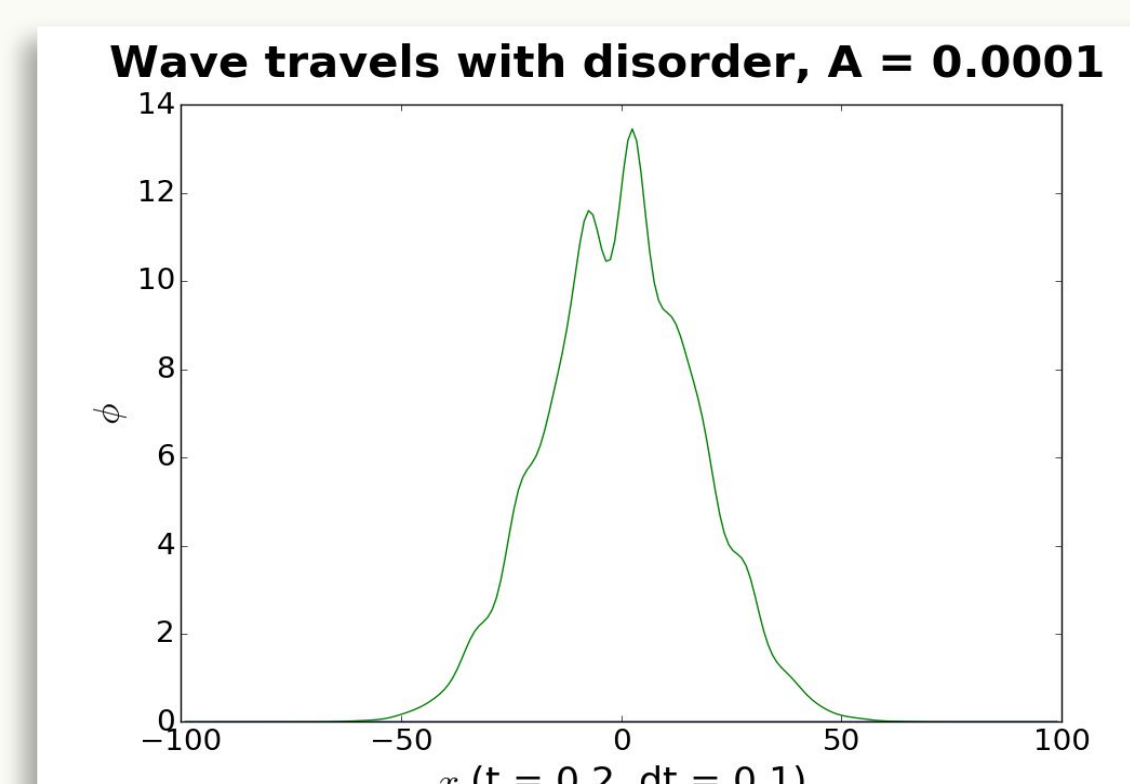
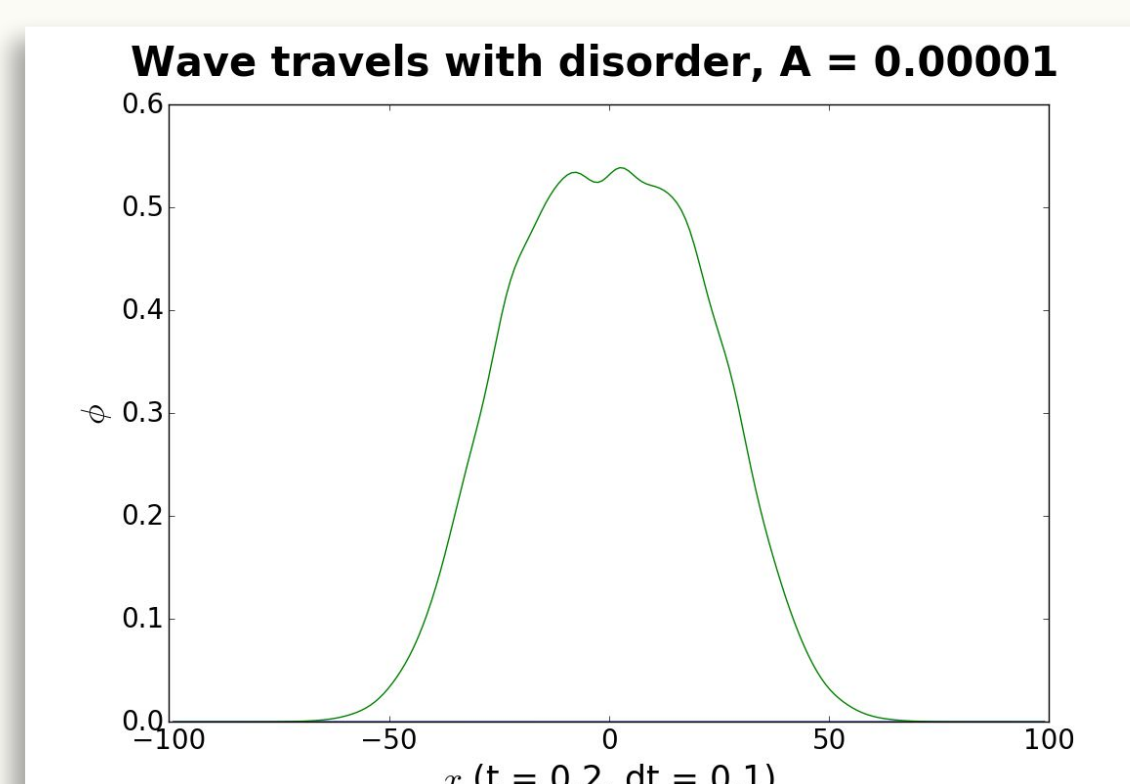
Analysis of Different Numerical Schemes

$$\frac{\partial^2 \phi}{\partial t^2} - \frac{\partial^2 \phi}{\partial x^2} + u(x)\phi = 0$$

With regular potential (t = 1 s)

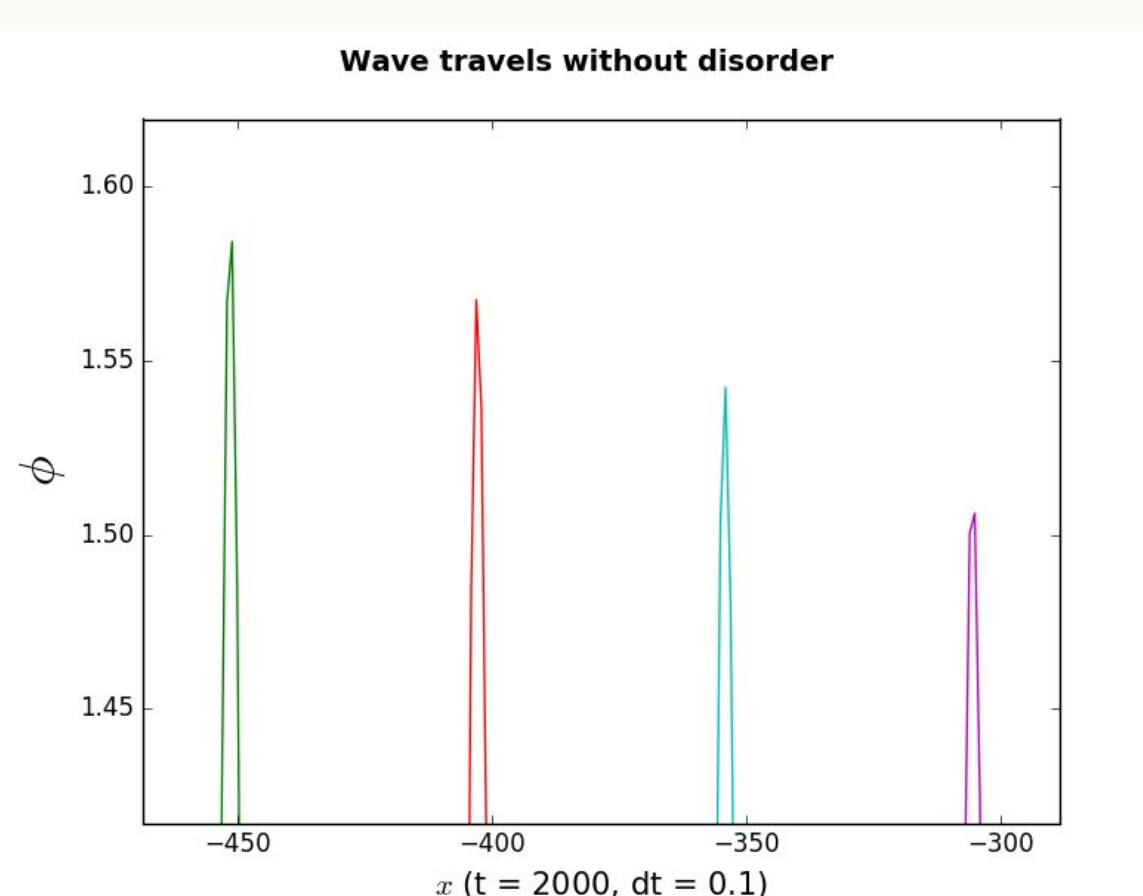
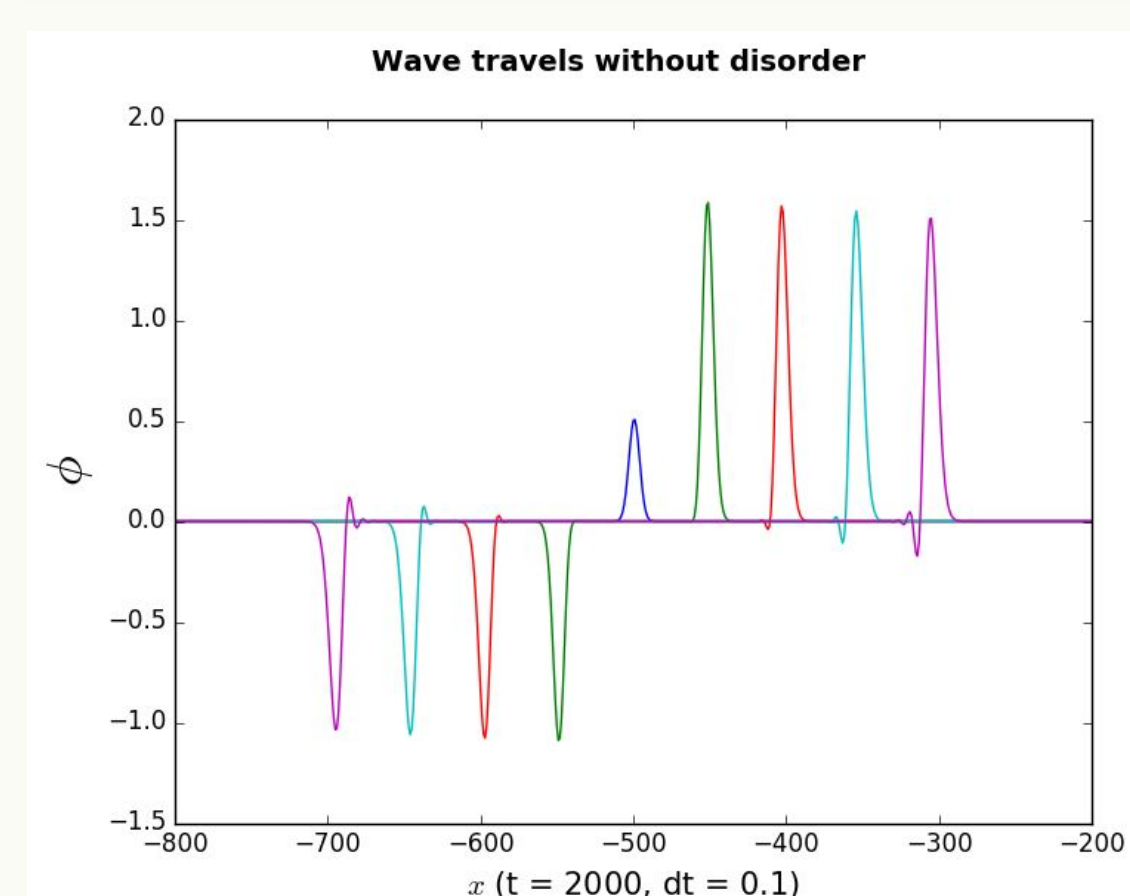


Crank-Nicolson is not perfect

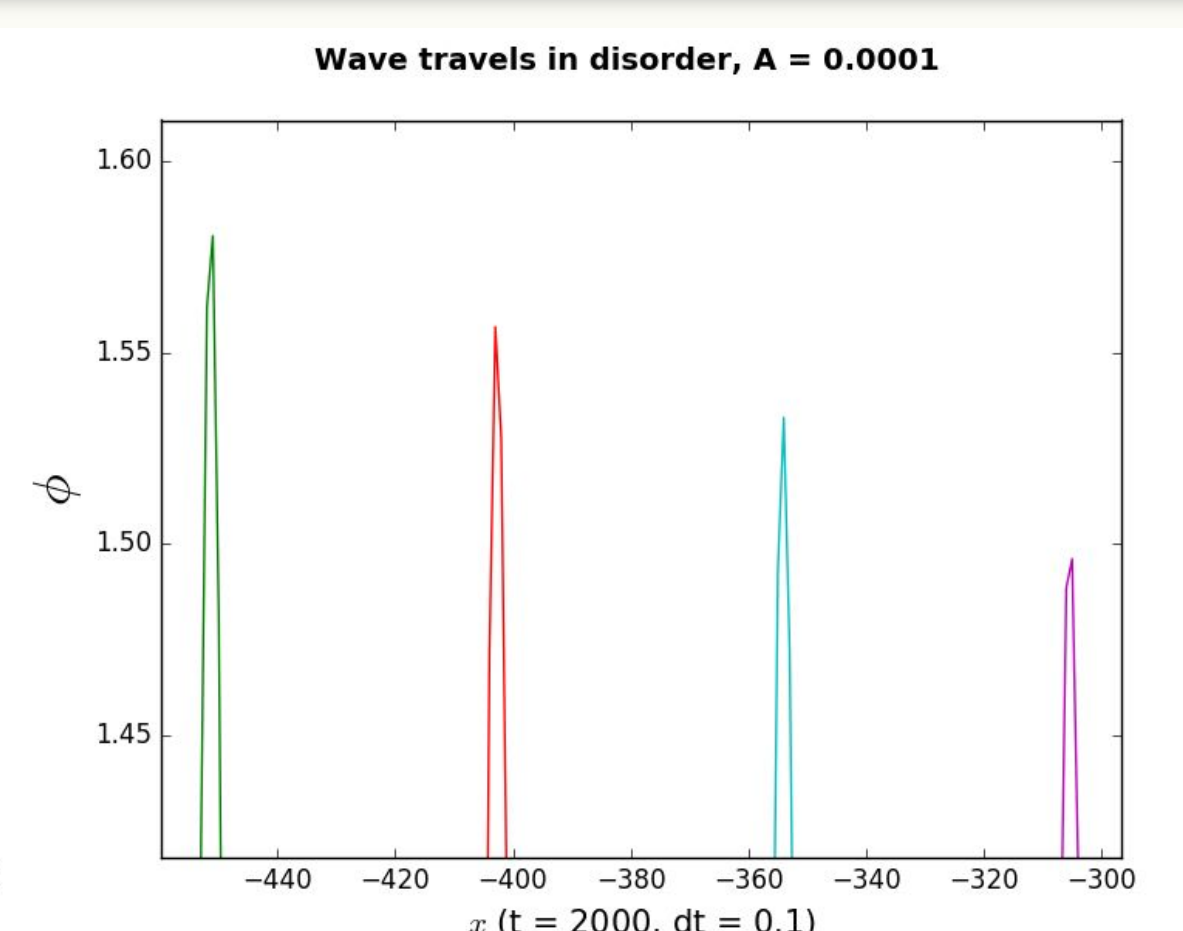
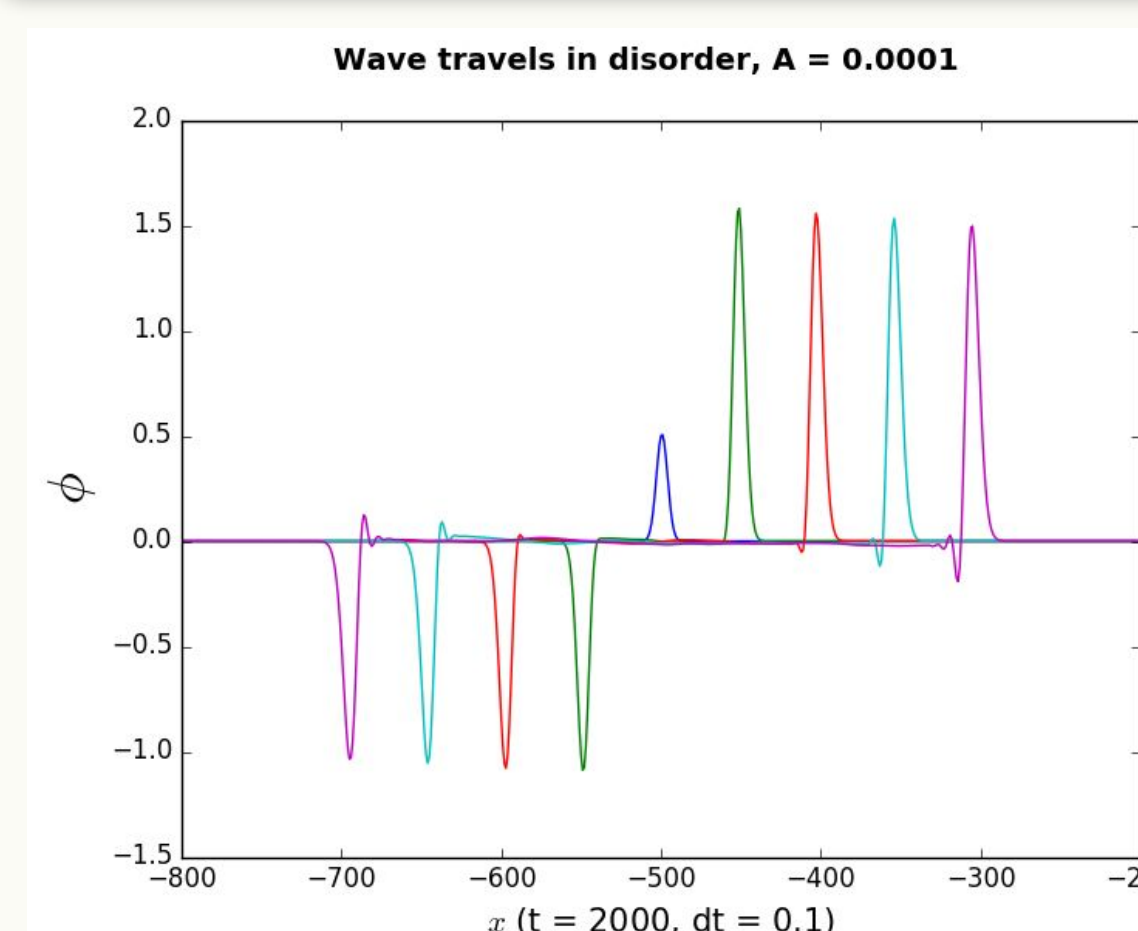


A very small scale of disorder can disrupt the system

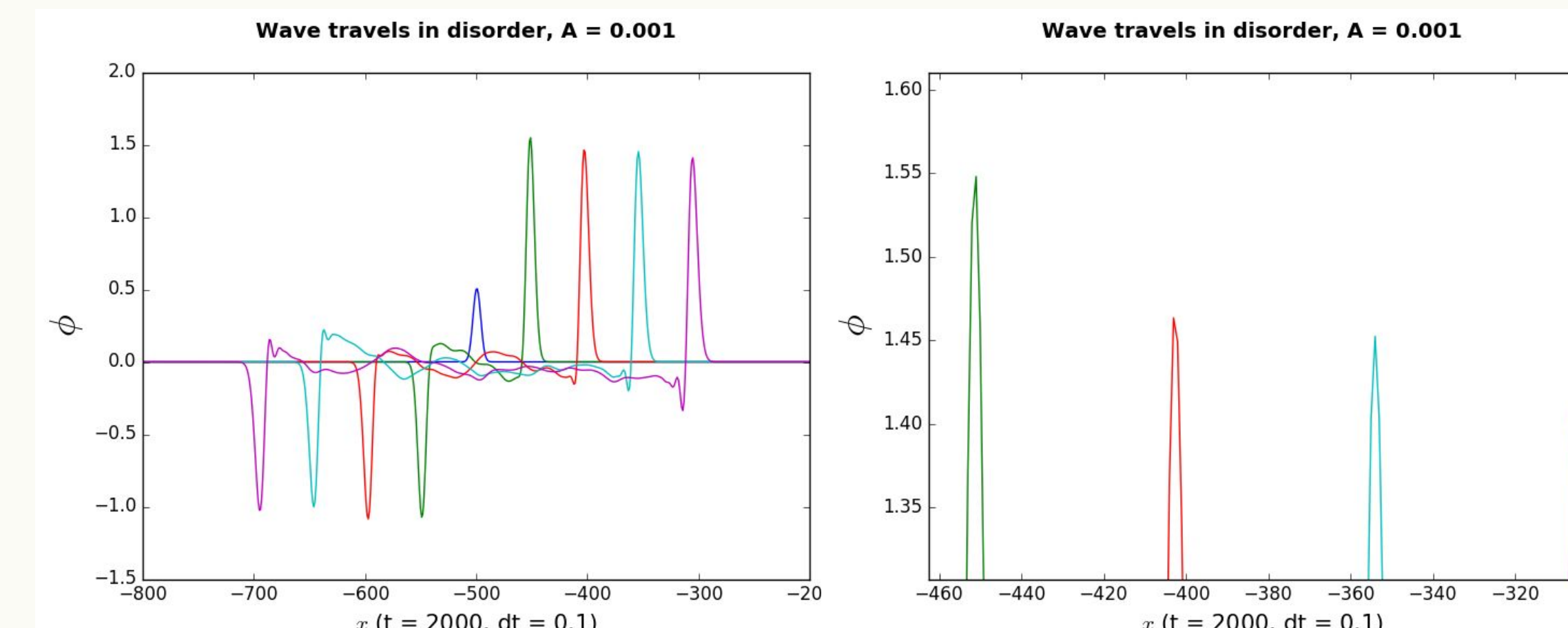
Symplectic Split Integration Schemes



Traveling wave and its decay



Decaying wave with disorder amplitude 0.0001



Decaying wave with disorder amplitude 0.001

In progress

Implement the third integrator.
Study of anticipated localization and conserved quantities.
Classification of the possible decaying pattern.

References

- *B Kramer and A MacKinnon, *Localization: theory and experiment*, Rep. Prog. Phys. 56 1469. (1993)
- *Press, William H. *Numerical Recipes in C*, 2nd ed. Cambridge: Cambridge Univ. Pr. (1995)
- * Ch. Skokos, D. O. Krimer, S. Komineas, and S. Flach, *Delocalization of wave packets in disordered nonlinear chains*, Phys. Rev. E 79, 056211, Pg. 27-28. (2009)

Acknowledgements

Department of Physics and Astronomy,
Bucknell University