

One-dimensional Optical Turbulence

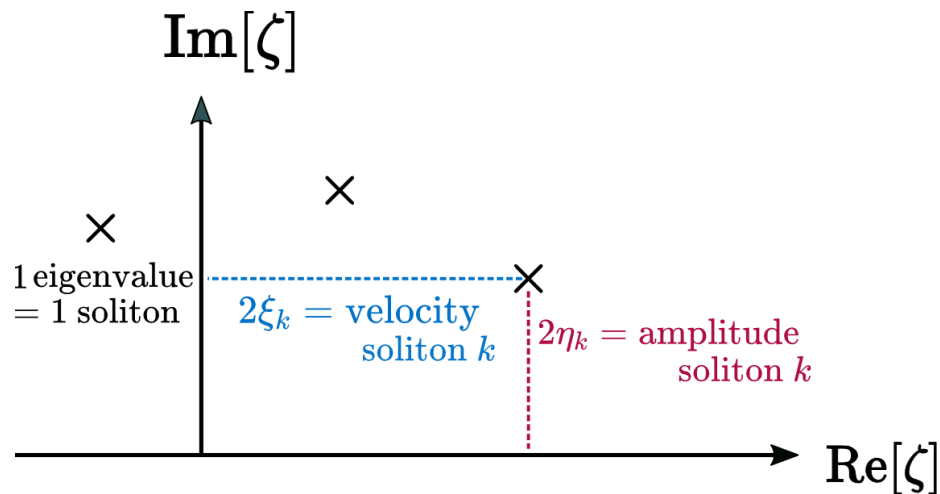
$$i \frac{\partial}{\partial t} u + \frac{1}{2} \frac{\partial^2}{\partial x^2} u + \left(1 - \frac{1}{g} \frac{\partial^2}{\partial x^2} \right)^{-1} |u|^2 = 0$$

modification to 1D pure
non-linear Schrödinger eq.

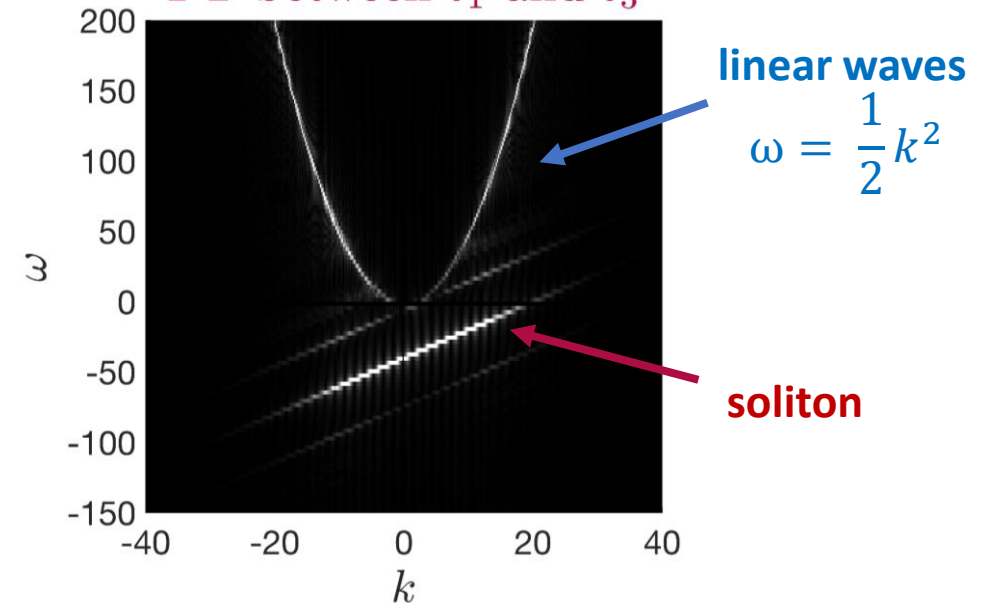
Non-integrable system
→ **turbulent system**

2 ways to characterize the system :

non-linear
spectrum

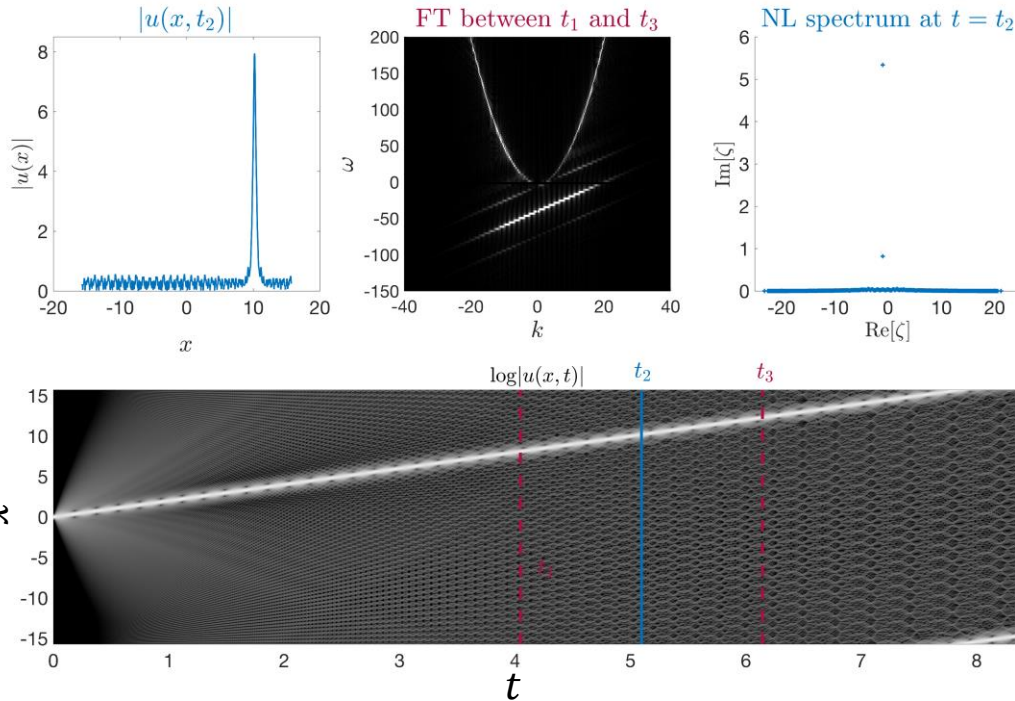


FT between t_1 and t_3

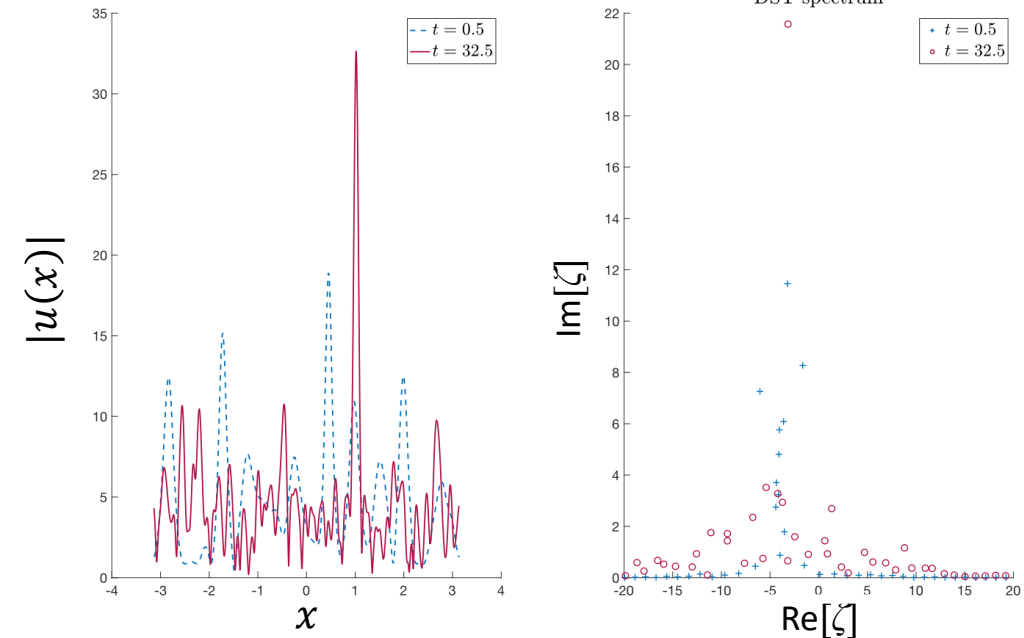


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Evolution of a *sech*-profile soliton



Initial condition $u_k = \begin{cases} = A e^{i\varphi_k} & \text{if } 6 \leq k \leq 9 \\ = 0 & \text{else} \end{cases}$



- ✓ Creation of waves
- ✓ Appearance of a second soliton

- ✓ Evolution towards a single big soliton
- ✓ Observed with spectrum