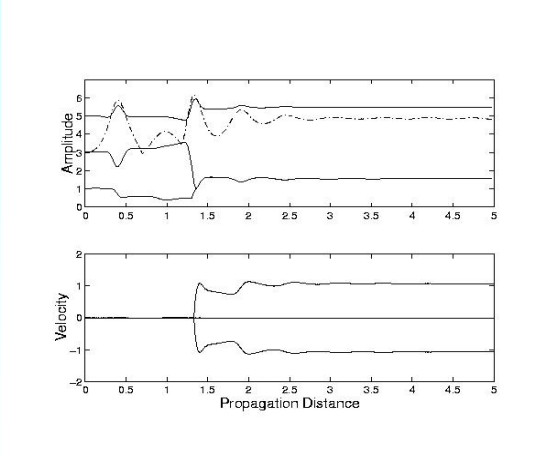
High-order soliton splitting (II)

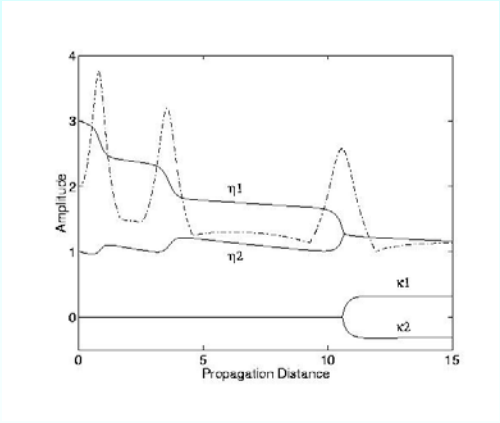
- Deeper understanding of high-order soliton fission can be obtained by studying the **evolution of the discrete spectrum of the scattering problem** associated with the NSE [2], thus treating nonparaxiality as a perturbation.
- **Focusing** stages introduce strong **shifts** in the **energy** eigenvalues. The **splitting** takes places when two of the constituent solitons become **degenerate**: a pair of equal energy and opposite transverse velocity escaping solitons is produced.



* The figures show the evolution of the **discrete** energy (upper figure) and transverse velocity (lower figure) **eigenvalues**. Dashed-dotted lines shows the beam peak amplitude. The beam parameters are the same as those from the previous page (N=3 and κ=0.005).

- The same kind of behaviour is found in **other situations** where the evolution of **high-order solitons** is studied in the presence of **perturbations of** the NSE [5].

* The figure shows the evolution of the discrete energy (η_1, η_2) and transverse velocity (κ_1,κ_2) eigenvalues of a N=2 soliton in the presence of **two-photon absorption** (K=0.01). Dashed-dotted lines show the peak amplitude of the beam.



- This bifurcation structure of the soliton eigenvalues found in high-order soliton splitting appears to be of a general nature and suggests the existence of an **exclusion principle** for solitons and, thus, a **fermion-like** character of solitons particles.