A Numerical Study of m-coupled Nonlinear Schrödinger Equation

Weichung Wang

Department of Applied Mathematics
National University of Kaohsiung
Kaohsiung, Taiwan

April 21, 2007

Outline

Features of the Beamer Class

- Normal LaTeX class.

Features of the Beamer Class

- Normal LaTeX class.
- Easy overlays.

Features of the Beamer Class

- Normal LaTeX class.
- Easy overlays.
- No external programs needed.

Outline

S. Equation

- When $m = 1$, the solution of NLS can be obtained through the following minimization

$$\inf_{\substack{\phi \geq 0 \\ \phi \in H^1(\mathbb{R}^n)}} \frac{\int_{\mathbb{R}^n} |\nabla \phi|^2 + \lambda \int_{\mathbb{R}^n} \phi^2}{\left(\int_{\mathbb{R}^n} \phi^4\right)^{1/2}}. \tag{1}$$

- An equivalent formulation is the following minimization:

$$\inf_{\phi \in \mathcal{N}_1} E(\phi) \tag{2a}$$

where

$$\mathcal{N}_1 = \left\{ \phi \in H^1(\mathbb{R}^n) |\ \phi \geq 0,\ \phi \not\equiv\ 0, \int_{\mathbb{R}^n} |\nabla \phi|^2 + \lambda \int_{\mathbb{R}^n} \phi^2 = \mu \int_{\mathbb{R}^n} \phi^4 \right\} \tag{2b}$$

$$E(\phi) = \frac{1}{2} \int_{\mathbb{R}^n} |\nabla \phi|^2 + \frac{\lambda}{2} \int_{\mathbb{R}^n} \phi^2 - \frac{\mu}{4} \int_{\mathbb{R}^n} \phi^4. \tag{2c}$$

- If ϕ satisfies (**??**) then ϕ is called a ground state solution.