Standing waves for some linear and nonlinearly coupled nonlinear Schrödinger equations

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Along this talk, will be presented some existence results, among others, for the two following systems of linear and nonlinearly coupled nonlinear Schrödinger equations:

$$\begin{cases} -\Delta u + \lambda_1 u = \mu_1 u^3 + \beta u v^2, & u \in W^{1,2}(\mathbb{R}^N) \\ -\Delta v + \lambda_2 v = \mu_2 v^3 + \beta u^2 v, & v \in W^{1,2}(\mathbb{R}^N) \end{cases} \tag{1}$$

where $\lambda_i, \mu_i > 0$, $i = 1, 2$, β is a real parameter and $x \in \mathbb{R}^N$, $N = 2, 3$.

$$\begin{cases} -\Delta u + u = u^3 + \lambda v, & u \in W^{1,2}(\mathbb{R}^N) \\ -\Delta v + v = v^3 + \lambda u, & v \in W^{1,2}(\mathbb{R}^N) \end{cases} \tag{2}$$

where $\lambda > 0$ and $N = 1, 2, 3$.
The details can be seen in [2, 3, 4], see also [1] for related results and applications to nonlinear optics.

[1] N. Akhmediev & A. Ankiewicz, "Solitons, nonlinear pulses and beams", Champman & Hall, London, 1997.

[2] A. Ambrosetti & E. Colorado, *Bound and ground states of coupled nonlinear Schrödinger equations*, C. R. Math. Acad. Sci. Paris **342** (2006), no. 2, 453-458.

[3] A. Ambrosetti & E. Colorado, *Standing Waves of Some Coupled Nonlinear Schrödinger Equations*, J. Lond. Math. Soc. (**2**) 75 (2007), no.1, 67-82.

[4] A. Ambrosetti, E. Colorado & D. Ruiz, *Multi-bump solitons to linearly coupled systems of nonlinear Schrödinger equations*, Calc. Var. Partial Differential Equations **30**, no. 1 (2007), 85-112.