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Local Mountain Pass for a Class of Elliptic Systems without Homogeneity on the Nonlinearity

We consider the gradient elliptic system given by

$$\begin{cases} -\varepsilon^2 \mathrm{div}(a(x)\nabla u) + u = Q_u(u,v) + \lambda K_u(u,v) \ \text{ in } \ \mathbb{R}^N, \\ -\varepsilon^2 \mathrm{div}(b(x)\nabla v) + v = Q_v(u,v) + \lambda K_v(u,v) \ \text{ in } \ \mathbb{R}^N, \end{cases}$$

where the potentials a, b are continuous, the nonlinearity $Q+\lambda K$ is not homogeneous. We study the subcritical, critical and supercritical cases. For $\varepsilon > 0$ small we show existence and concentration results using the penalization method.

Keywords: Gradient elliptic systems, Schroedinger equation.

MSC: 35J20, 35J50.