Multiple positive solutions for semilinear elliptic systems

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Abstract

We investigate the effect of the coefficient $f(x)$ of the subcritical nonlinearity. Under some assumptions, for sufficiently small $\varepsilon, \lambda, \mu > 0$, there are at least $k(\geq 1)$ positive solutions of the semilinear elliptic systems

$$\begin{cases} -\varepsilon^2 \Delta \overline{u} + \overline{u} = \lambda g(x) \left| \overline{u} \right|^{q-2} \overline{u} + \dfrac{\alpha}{\alpha + \beta} f(x) \left| \overline{u} \right|^{\alpha-2} \overline{u} \left| \overline{v} \right|^{\beta} & \text{in } \mathbb{R}^N; \\ -\varepsilon^2 \Delta \overline{v} + \overline{v} = \mu h(x) \left| \overline{v} \right|^{q-2} \overline{v} + \dfrac{\beta}{\alpha + \beta} f(x) \left| \overline{u} \right|^{\alpha} \left| \overline{v} \right|^{\beta-2} \overline{v} & \text{in } \mathbb{R}^N; \\ u, \ v \in H^1 \left(\mathbb{R}^N \right), \end{cases}$$

where $\alpha > 1$, $\beta > 1$, $2 < q < p = \alpha + \beta < 2^* = 2N/(N-2)$ for $N \geq 3$.

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