Papageorgiou, Nikolaos S.; Vetro, Calogero; Vetro, Francesca
Multiple nodal solutions for semilinear Robin problems with indefinite linear part and concave terms. (English) [Zbl 1390.35094]

Given a bounded domain $\Omega \subseteq \mathbb{R}^N$ with a $C^2$-boundary $\partial\Omega$, the authors study the following semilinear Robin problem

$$\begin{align*}
-\Delta u(z) + \xi(z)u(z) &= \vartheta(z)|u(z)|^{q-2}u(z) + f(z,u(z)) \quad \text{in} \quad \Omega, \\
\frac{\partial u}{\partial n} + \beta(z)u &= 0 \quad \text{on} \quad \partial\Omega,
\end{align*}$$

where $1 < q < 2$, $\xi \in L^s(\Omega)$ with $s > N$ being sign-changing, $\vartheta \in L^\infty(\Omega)$, $\vartheta(z) > 0$ for almost all $z \in \Omega$ and $f : \Omega \times \mathbb{R} \rightarrow \mathbb{R}$ is a Carathéodory function of arbitrary growth. By applying a variant of the symmetric mountain pass theorem, the authors show the existence of smooth nodal (i.e., sign-changing) solutions which converge to zero in $C^1(\Omega)$. Furthermore, if the coefficient of the concave term (that is, $\vartheta(z)|u(z)|^{q-2}u(z)$) is sign changing, then it is shown again the existence of a sequence of smooth solutions converging to zero in $C^1(\Omega)$ but without any knowledge about the sign.

Reviewer: Patrick Winkert (Berlin)

MSC:
35J61 Semilinear elliptic equations
35J20 Variational methods for second-order elliptic equations

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semilinear Robin problem; indefinite potential; smooth nodal solutions

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References:


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