Non-symmetric Positive Solutions for Symmetric Dirichlet Elliptic Problems

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In this talk the speaker will present some results on the existence of non-radially symmetric positive solutions of the following radially symmetric problems when \( \varepsilon \) is small positive number:

\[
\begin{align*}
-\Delta u &= |x|^\tau u^{\frac{N+\varepsilon}{N-\varepsilon}} & x \in \Omega, \\
u &> 0 & x \in \Omega, \\
u &= 0 & x \in \partial\Omega,
\end{align*}
\]

where \( N \geq 3, \Omega \) be the unit ball in \( \mathbb{R}^N \) centered at the origin and \( \tau > 0 \) be a given number.

and

\[
\begin{align*}
-\Delta u + (\frac{1}{q} - h(x))u &= (1 - f(x))u^{p} & \text{in} \ \mathbb{R}^N, \\
u &> 0 & \text{in} \ \mathbb{R}^N, \\
u &\in H^1(\mathbb{R}^N),
\end{align*}
\]

where \( h(x) \) and \( f(x) \) are nonnegative radially symmetric functions in \( L^\infty(\mathbb{R}^N) \), \( h(x) \) and \( f(x) \) have compact support in \( \mathbb{R}^N \), \( f(x) \leq 1 \) for all \( x \in \mathbb{R}^N \), \( 1 < p < +\infty \) for \( N = 1, 2, 1 < p < \frac{N+2}{N-2} \).