STRUCTURE OF THE POSITIVE RADIAL SOLUTIONS FOR A SUPERCRITICAL NEUMANN PROBLEM IN A BALL

YASUHITO MIYAMOTO

Let $B \subset \mathbb{R}^N$, $N \geq 3$, be a unit ball. We study the positive radial solution of the Neumann problem

$$\begin{cases} \varepsilon^2 \Delta u - u + u^p = 0 & \text{in } B, \\ \partial_\nu u = 0 & \text{on } \partial B, \end{cases} \tag{1}$$

where $\varepsilon > 0$ is a positive parameter and $p > p_S := (N+2)/(N-2)$.

This problem arises in stationary problems of the shadow system of the Gierer-Meinhardt model and the Keller-Segel model with logarithmic sensitivity function.

We will obtain the global bifurcation diagram of this problem. In particular, we show that there is a sequence $\{\varepsilon_n^*\}_{n=1}^\infty$ such that for each ε_n, (1) has infinitely many positive radial solutions if $p_S < p < p_{JL}$. Here,

$$p_{JL} := \begin{cases} 1 + \dfrac{4}{N - 4 - 2\sqrt{N-1}} & \text{if } N \geq 11, \\ \infty & \text{if } 2 \leq N \leq 10. \end{cases}$$

References

[1] Y. Miyamoto, *Structure of the positive radial solutions for the supercritical Neumann problem $\varepsilon^2 \Delta u - u + u^p = 0$ in a ball*, UTMS Preprint Series 2013, http://kyokan.ms.u-tokyo.ac.jp/users/preprint/pdf/2013-6.pdf

Graduate School of Mathematical Sciences, The University of Tokyo, 3-8-1 Komaba, Meguro-ku, Tokyo 153-8914, Japan

E-mail address: miyamoto@ms.u-tokyo.ac.jp

This work was partially supported by the Japan Society for the Promotion of Science, Grant-in-Aid for Young Scientists (B) (Subject No. 24740100) and by Keio Gijuku Academic Development Funds.