

Grossi, M.; Kesavan, S.; Pacella, F.; Ramaswamy, M.

Symmetry of positive solutions of some nonlinear equations. (English) Zbl 0927.35039
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The Dirichlet boundary problem to the elliptic equation $-\Delta u = f(u)$ in Ω is considered, where $f : \mathbb{R} \rightarrow \mathbb{R}$ is a nonnegative and continuous function. An interesting fact concerning this problem is that there is no result so far about symmetry of the solutions provided that the hypothesis of Lipschitz continuity or positivity of $f(u)$ is dropped. Taking into account a result due to Kichenassamy and Smoller (1990) there is no chance to hope that all nonnegative solutions in a ball are radial provided that $f(u)$ changes its sign. Applying suitable approximation procedures, the authors show that isolated solutions with nonvanishing index (with respect to a canonical formulation of the considered problems as operator equations) are limits of symmetric functions and hence are symmetric themselves. By the method introduced here one can study the symmetry of the solution of Dirichlet problem for the above stated elliptic equation and also for equation with p -Laplacian like $-\operatorname{div}(|\nabla u|^{p-2}\nabla u) = f(u)$ ($p \neq 2$) in Ω . However, the strict monotonicity in one-dimensional direction could not be obtained.

Reviewer: [Dimitar Kolev \(Sofia\)](#)

MSC:

[35J65](#) Nonlinear boundary value problems for linear elliptic equations
[35B99](#) Qualitative properties of solutions to partial differential equations

Cited in **6** Documents

Keywords:

[elliptic equation](#); [symmetry](#); [isolated solutions](#); [Dirichlet problem](#); [p-Laplacian](#)

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