

An eigenvalue optimization problem for the p -Laplacian

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Abstract

It has been shown by Ashbaugh and Chatelain (personal communication), Harrell et. al. (SIAM J. Math. Analysis 33 (2001), 240-259), Kesavan (Proc. R. Soc. Edinb. 133A (2003), 617-624) among others that the first eigenvalue for the Dirichlet Laplacian in a punctured ball, with the puncture having the shape of a ball, is maximum if and only if the balls are concentric. Recently, Emamizadeh and Zivari-Rezapour (Proc. Am. Math. Soc. 136 (2007), 1325-1331) have tried to generalize this result to the case of the p -Laplacian but could succeed only in proving a domain monotonicity result for a weighted eigenvalue problem in which the weights need to satisfy some restrictive assumptions which excludes the constant weight. In this talk, we show how to obtain the result for the original eigenvalue problem for the Dirichlet p -Laplacian ($1 < p < \infty$) with constant weight. The uniqueness of the maximizing domain in the nonlinear case is still an open question.

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