Hoffman-Ostenhof, M.; **Hoffman-Ostenhof, T.**

On the local behaviour of nodes of solutions of Schrödinger equations in dimensions ≥ 3. (English) Zbl 0725.35005

Commun. Partial Differ. Equations 15, No. 4, 435-451 (1990).

In 1955 L. Beers showed that any solution ψ of Schrödinger's equation $[-\nabla^2 + V)\psi = 0$, which tends to zero at infinity with finite order, must have the same behaviour at infinity as a harmonic polynomial P_M. In the present paper this result is exploited in order to investigate the nodes of ψ in a neighborhood of the origin. Suppose the nodal set is known, that is the set of points for which $\psi = 0$ around the origin. Does this set locally coincide with the nodal set of a harmonic polynomial of M-degree? The answer is affirmative in the sense that the difference between the measures of the two nodal sets, intersected with the (n-1)-dimensional sphere of radius r, tends to zero with n. If, moreover, $n = 3$, then the eigenfunctions of Schrödinger's equation converge to the eigenfunctions of spherical harmonics on the two-dimensional sphere of radius r.

Reviewer: P.Villaggio (Pisa)

MSC:

35B05 Oscillation, zeros of solutions, mean value theorems, etc. in context of PDEs

35J10 Schrödinger operator, Schrödinger equation

Keywords:

nodal set; harmonic polynomial

Full Text: DOI

References:

[1] DOI: 10.1007/BF00251498 · Zbl 0664.35016 · doi:10.1007/BF00251498

[2] Aronszajn N., J. Math. Pures Appl. 36 pp 235– (1957)

[3] Berard P., Annal. Sci. Ec. Norm. Super. 15 pp 513– (1982)

[4] DOI: 10.1002/cpa.3160080404 · Zbl 0066.08101 · doi:10.1002/cpa.3160080404

[5] DOI: 10.1016/0022-0396(85)90133-0 · Zbl 0593.35047 · doi:10.1016/0022-0396(85)90133-0

[6] DOI: 10.1007/BF02568142 · Zbl 0334.35022 · doi:10.1007/BF02568142

[7] DOI: 10.1007/BF01393691 · Zbl 0659.58047 · doi:10.1007/BF01393691

[8] Donnelly H., Nodal sets of eigenfunctions on Riemannian manifolds with boundar 93 (1988)

[9] Hardt R., Nodal sets for solutions of elliptic equations 93 (1988) · Zbl 0692.35005

[10] DOI: 10.1007/BF01228411 · Zbl 0658.35021 · doi:10.1007/BF01228411

[11] DOI: 10.1007/BF01163288 · Zbl 0627.35024 · doi:10.1007/BF01163288

[12] Hoffmann–ostenhof M., Proceedings of the Congerence on Partia Differential Equations in Holzhau (GDR) Teubner Texte zur mathematik, in press 198 (1988)

[13] DOI: 10.1080/03605307708820059 · Zbl 0377.31008 · doi:10.1080/03605307708820059

[14] DOI: 10.1080/03605308708820513 · Zbl 0654.35036 · doi:10.1080/03605308708820513