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Existence and concentration of solutions for singularly perturbed doubly nonlocal elliptic equations. (English) Zbl 1437.35308

Commun. Contemp. Math. 22, No. 1, Article ID 1850074, 37 p. (2020).

MSC:

35J60 Nonlinear elliptic equations
35Q55 NLS equations (nonlinear Schrödinger equations)

Keywords:

nonlocal elliptic problem; Hartree-type nonlinearity; penalization method; single-peak solution; concentration phenomena

Full Text: DOI

References:

[1] Ackermann, N., On a periodic Schrödinger equation with nonlocal superlinear part, Math. Z.248 (2004) 423-443. · Zbl 1059.35037

[2] Alves, C. O. and Yang, M., Existence of semiclassical ground state solutions for a generalized Choquard equation, J. Differential Equations257 (2014) 4133-4164. · Zbl 1309.35036

[3] Berestycki, H. and Lions, P. L., Nonlinear scalar field equations, I: Existence of a ground state, Arch. Ration. Mech. Anal.82 (1983) 313-345. · Zbl 0533.35029

[4] Byeon, J. and Jeanjean, L., Standing waves for nonlinear Schrödinger equations with a general nonlinearity, Arch. Ration. Mech. Anal.185 (2007) 185-200. · Zbl 1132.35078

[5] Byeon, J. and Jeanjean, L., Multi-peak standing waves for nonlinear Schrödinger equations with a general nonlinearity, Discrete Contin. Dynam. Syst.19 (2007) 255-269. · Zbl 1155.35089

[6] Byeon, J. and Wang, Z.-Q., Standing waves with a critical frequency for nonlinear Schrödinger equations II, Calc. Var. Partial Differential Equations18 (2003) 207-219. · Zbl 1073.35199

[7] Cingolani, S. and Secchi, S., Semiclassical analysis for pseudo-relativistic Hartree equations, J. Differential Equations258 (2015) 4156-4179. · Zbl 1319.35204

[8] Cingolani, S., Secchi, S. and Squassina, M., Semi-classical limit for Schrödinger equations with magnetic field and Hartree-type nonlinearities, Proc. Roy. Soc. Edinburgh Sect. A140 (2010) 973-1009. · Zbl 1215.35146

[9] del Pino, M. and Felmer, P., Local mountain passes for semilinear elliptic problems in unbounded domains, Calc. Var. Partial Differential Equations4 (1996) 121-137. · Zbl 0844.35032

[10] del Pino, M. and Felmer, P., Multi-peak bound states for nonlinear Schrödinger equations, Ann. Inst. H. Poincaŕe Anal. Non Linéaire15 (1998) 127-149. · Zbl 0901.35023

[11] Figueiredo, G. M., Ikoma, N. and Júnior, J. R. S., Existence and concentration result for the Kirchhoff type equations with general nonlinearities, Arch. Ration. Mech. Anal.213 (2014) 931-979. · Zbl 1302.35356

[12] Floer, A. and Weinstein, A., Nonspreading wave packets for the cubic Schrödinger equations with a bounded potential, J. Funct. Anal.69 (1986) 397-408. · Zbl 0613.35076

[13] Gilbarg, D. and Trudinger, N. S., Elliptic partial differential equations of second order, 2nd edition, , Vol. 224 (Springer, Berlin, 1983). · Zbl 0562.35001

[14] Gui, C., Existence of multi-bump solutions for nonlinear Schrödinger equations via variational method, Comm. Partial Differential Equations21 (1996) 787-820. · Zbl 0857.35116

[15] He, Y. and Li, G., Standing waves for a class of Kirchhoff type problems in \(\mathbb{R}^3\) involving critical Sobolev exponents, Calc. Var. Partial Differential Equations54 (2015) 3067-3106. · Zbl 1328.35046

[16] He, Y., Li, G. and Peng, S., Concentrating bound states for Kirchhoff type problem in \(\mathbb{R}^3\) involving critical Sobolev exponents, Adv. Nonlinear Stud.14 (2014) 441-468.

[17] He, X. and Zou, W., Existence and concentration behavior of positive solutions for a Kirchhoff equation in \(\mathbb{R}^3\), J. Differential Equations252 (2012) 1813-1834. · Zbl 1235.35093

[18] Jeanjean, L., Existence of solutions with prescribed norm for semilinear elliptic equations, Nonlinear Anal.28 (1997) 1633-1659. · Zbl 0877.35091

[19] Kang, X. and Wei, J., On interacting bumps of semi-classical states of nonlinear Schrödinger equations, Adv. Differential

Equations5 (2000) 899-928. · Zbl 1217.35065

[20] Kirchhoff, G., Mechanik (Teubner, Leipzig, 1883).

[21] Lieb, E. H., Existence and uniqueness of the minimizing solution of Choquard's nonlinear equation, Stud. Appl. Math.57 (1977) 93-105. · Zbl 0369.35022

[22] Lieb, E. H. and Loss, M., Analysis, 2nd edition, , Vol. 14 (American Mathematical Society, 2001). · Zbl 0966.26002

[23] Lieb, E. H. and Simon, B., The Hartree-Fock theory for Coulomb systems, Comm. Math. Phys.53 (1977) 185-194.

[24] Lions, J. L., On some questions in boundary value problems of mathematical physics, North-Holland Math. Stud.30 (1978) 284-346.

[25] Lions, P. L., The Choquard equation and related questions, Nonlinear Anal.4 (1980) 1063-1072. · Zbl 0453.47042

[26] Lions, P. L., The concentration-compactness principle in the calculus of variations. The locally compact case. Part II, Ann. Inst. H. Poincaré Anal. Non Linéaire1 (1984) 223-283. · Zbl 0704.49004

[27] Lü, D. and Peng, S., Existence and asymptotic behavior of vector solutions for coupled nonlinear Kirchhoff-type systems, J. Differential Equations263 (2017) 8947-8978. · Zbl 1376.35051

[28] Ma, L. and Zhao, L., Classification of positive solitary solutions of the nonlinear Choquard equation, Arch. Ration. Mech. Anal.195 (2010) 455-467. · Zbl 1185.35260

[29] Moroz, V. and Van Schaftingen, J., Ground states of nonlinear Choquard equations: Existence, qualitative properties and decay asymptotics, J. Funct. Anal.265 (2013) 153-184. · Zbl 1285.35048

[30] Moroz, V. and Van Schaftingen, J., Existence of ground states for a class of nonlinear Choquard equations, Trans. Amer. Math. Soc.367 (2015) 6557-6579. · Zbl 1325.35052

[31] Moroz, V. and Van Schaftingen, J., Semi-classical states for the Choquard equation, Calc. Var. Partial Differential Equations52 (2015) 199-235. · Zbl 1309.35029

[32] Oh, Y.-G., Stability of semiclassical bound states of nonlinear Schrödinger equations with potentials, Comm. Math. Phys.121 (1989) 11-33. · Zbl 0693.35132

[33] Oh, Y.-G., On positive multi-lump bound states of nonlinear Schrödinger equations under multiple well potential, Comm. Math. Phys.131 (1990) 223-253. · Zbl 0753.35097

[34] Pucci, P. and Serrin, J., A general variational identity, Indiana Univ. Math. J.35 (1986) 681-703. · Zbl 0625.35027

[35] Rabinowitz, P. H., On a class of nonlinear Schrödinger equations, Z. Angew. Math. Phys.43 (1992) 270-291. · Zbl 0763.35087

[36] Sun, X. and Zhang, Y., Multi-peak solution for nonlinear magnetic Choquard type equation, J. Math. Phys.55 (2014) 031508, 25 pp. · Zbl 1296.35180

[37] Wang, X., On the concentration of positive bound states of nonlinear Schrödinger equations, Comm. Math. Phys.153 (1993) 229-244. · Zbl 0795.35118

[38] Wang, J., Tian, L., Xu, J. and Zhang, F., Multiplicity and concentration of positive solutions for a Kirchhoff type problem with critical growth, J. Differential Equations253 (2012) 2314-2351. · Zbl 1402.35119

[39] Yang, M., Zhang, J. and Zhang, Y., Multi-peak solution for nonlinear Choquard equation with a general nonlinearity, Commun. Pure Appl. Anal.16 (2017) 493-512. · Zbl 1364.35027

[40] Zelati, V. C. and Rabinowitz, P. H., Homoclinic orbits for second order Hamiltonian systems possessing superquadratic potentials, J. Amer. Math. Soc.4 (1991) 693-727. · Zbl 0744.34045