HOMOCLINIC SOLUTIONS FOR A CLASS OF SECOND ORDER HAMILTONIAN SYSTEMS

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Abstract. The existence of homoclinic solutions is obtained by the Mountain Pass theorem for a class of the second order Hamiltonian systems $\ddot{q}(t) + \nabla V(t, q(t)) = 0$, where $V(t, x) = -K(t, x) + W(t, x) \in C^1(\mathbb{R} \times \mathbb{R}^N, \mathbb{R})$, $K(t, x)$ is not a quadratic form in x and $W(t, x)$ is superquadratic in x.

REFERENCES

[1] C. O. ALVES, P. C. CARRIÃO, O. H. MIYAGAKI, *Existence of homoclinic orbits for asymptotically periodic systems involving Duffing-like equation*, Appl. Math. Lett., **16**, 5 (2003), 639–642.

[2] V. COTI-ZELATI, P. H. RABINOWITZ, *Homoclinic orbits for second order Hamiltonian systems possessing superquadratic potentials*, J. Amer. Math. Soc., **4**, 4 (1991), 693–727.

[3] P. C. CARRIÃO, O. H. MIYAGAKI, *Existence of homoclinic solutions for a class of time-dependent Hamiltonian systems*, J. Math. Anal. Appl., **230** (1999), 157–172.

[4] Y. H. DING, *Existence and multiplicity results for homoclinic solutions to a class of Hamiltonian systems*, Nonlinear Anal., **25** (1995), 1095–1113.

[5] P. L. FELMER, E. A. DE B. E SILVA, *Homoclinic and periodic orbits for Hamiltonian systems*, Ann. Scuola Norm. Sup. Pisa Cl. Sci., **26** (1998), 285–301.

[6] M. IZYDOREK, J. JANCZEWSKA, *Homoclinic solutions for a class of the second order Hamiltonian systems*, J. Differential Equations, **219**, 2 (2005), 375–389.

[7] P. KORMAN, A. C. LAZER, *Homoclinic orbits for a class of symmetric Hamiltonian systems*, Electron. J. Differential Equations, **1** (1994), 1–10.

[8] X. LV, S. P. LU, P. YAN, *Existence of homoclinic solutions for a class of second-order Hamiltonian systems*, Nonlinear Analysis, **72** (2010), 390–398.

[9] Y. LV, C. L. TANG, *Existence of even homoclinic orbits for second-order Hamiltonian systems*, Nonlinear Anal., **67**, 7 (2007), 2189–2198.

[10] J. MAWHIN, M. WILLEM, *Critical Point Theory and Hamiltonian Systems*, Springer Verlag, New York, 1989.

[11] W. OMANA, M. WILLEM, *Homoclinic orbits for a class of Hamiltonian systems*, Differential Integral Equations, **5**, 5 (1992), 1115–1120.

[12] Z. Q. OU, C. L. TANG, *Existence of homoclinic solution for the second order Hamiltonian systems*, J. Math. Anal. Appl., **291**, 1 (2004), 203–213.

[13] P. H. RABINOWITZ, *Homoclinic orbits for a class of Hamiltonian systems*, Proc. Roy. Soc. Edinburgh Sect., A **114** (1990), 33–38.

[14] P. H. RABINOWITZ, K. TANAKA, *Some results on connecting orbits for a class of Hamiltonian systems*, Math. Z., **206** (1990), 473–499.

[15] A. SALVATORE, Multiple homoclinic orbits for a class of second order perturbed Hamiltonian systems, Dynamical systems and differential equations (Wilmington, NC, 2002), Discrete Contin. Dyn. Syst., 2003, suppl., 778–787.

[16] L. L. WAN, C. L. TANG, *Homoclinic orbits for a class of the second order hamiltonian systems*, Acta Mathematica Scientia, Series B, **30**, 1 (2010), 312–318.

[17] L. L. WAN, C. L. TANG, *Existence and multiplicity of homoclinic orbits for second order Hamiltonian systems without (AR) condition*, Discrete and Continuous Dynamical Systems, Series B, **15**, 1 (2011), 255–271.

[18] L. L. WAN, C. L. TANG, *Existence of homoclinic orbits for second order Hamiltonian systems without (AR) condition*, Nonlinear Analysis, **74**, 16 (2011), 5303–5313.

[19] J. YANG, F. B. ZHANG, *Infinitely many homoclinic orbits for the second-order Hamiltonian systems with super-quadratic potentials*, Nonlinear Analysis: Real World Applications, **10**, 3 (2009), 1417–1423.

[20] W. M. ZOU, S. J. LI, *Infinitely many homoclinic orbits for the second-order hamiltonian systems*, Appl. Math. Lett., **16**, 8 (2003), 1283–1287.

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