# MULTIPLICITY RESULTS FOR A DISCRETE BOUNDARY VALUE PROBLEM VIA CRITICAL POINT THEORY 

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#### Abstract

This paper is a survey on some recent multiplicity results, contained in [11], for a discrete boundary value problem involving the p-Laplacian via critical point theory. An overview on the abstract critical points results used to obtain them it is also given. Key Words and Phrases: Difference equations, critical point theory, nonlinear boundary value problems.


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## References

[1] R.P. Agarwal, Difference Equations and Inequalities: Theory, Methods and Applications, Marcel Dekker, New York-Basel, 2000.
[2] R.P. Agarwal, K. Perera and D. O'Regan, Multiple positive solutions of singular and nonsingular discrete problems via variational methods, Nonlinear Anal., 58(2004), 69-73.
[3] R.P. Agarwal, K. Perera and D. O'Regan, Multiple positive solutions of singular discrete p-Laplacian problems via variational methods, Advance in Difference Equations, 2(2005), 93-99.
[4] R.P. Agarwal, D. O'Regan and P. J. Y. Wong, Positive Solutions of Differential, Difference and Integral Equations, Kluwer Academic Publishers, Dordrecht, 1999.
[5] D. Bai and Y. Xu, Nontrivial solutions of boundary value problems of second-order difference equations, J. Math. Anal. Appl., 326(2007), 297-302.

[^0][6] D. Averna, G. Bonanno, A three critical points theorem and its applications to the ordinary Dirichlet problem, Topol. Methods Nonlinear Anal., 22(2003), 93-103.
[7] D. Averna and G. Bonanno, A mountain pass theorem for a suitable class of functions, Rocky Mountain J. Math., to appear.
[8] G. Bonanno, Multiple critical points theorems without the Palais-Smale condition, J. Math. Anal. Appl., 299(2004), 600-614.
[9] G. Bonanno, P. Candito, On a class of Nonlinear Variational-Hemivariational Inequalities, Appl. Anal., 83(2004), 1229-1244.
[10] G. Bonanno and P. Candito, Non-differentiable functions with applications to elliptic equations with discontinuous nonlinearities, J. Differential Equations, to appear.
[11] P. Candito and N. Giovannelli, Multiple solutions for a discrete boundary value problem, Comput. Math. Appl., to appear.
[12] K.C. Chang, Variational methods for non-differentiable functionals and their applications to partial differential equations, J. Math. Anal. Appl., 80(1981), 102-129.
[13] F.H. Clarke, Optimization and Nonsmooth Analysis, Classics Appl. Math. 5, SIAM, Philadelphia, 1990.
[14] F. Faraci and A. Iannizzotto, Multiplicity theorems for discrete boundary problems, Aequationes Math., 74(2004), 111-118.
[15] W.G. Kelly and A.C. Peterson, Difference Equations. An Introduction with Applications.
[16] H. Liang and P. Weng, Existence and multiple solutions for a second-order difference boundary value problem via critical point theory, J. Math. Anal. Appl., 326(2007), 511520.
[17] S.A. Marano and D. Motreanu, On a three critical points theorem for non differentiable functions and applications to nonlinear boundary value problems, Nonlinear Anal., 48(2002), 37-52.
[18] D. Motreanu and P.D. Panagiotopoulos, Minimax Theorems and Qualitative Properties of the Solutions of Hemivariational Inequalities, Nonconvex Optim. Appl., 29, Kluwer, Dordrecht, 1998.
[19] B. Ricceri, On a three critical points theorem, Arch. Math. (Basel), 75(2000), 220-226.
[20] G. Zhang, W. Zhang and S. Liu, Existence of $2^{n}$ nontrivial solutions for a discrete two-point boundary value problems, Nonlinear Anal., 59(2004) 1181-1187.

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