

EXISTENCE AND MULTIPLICITY OF SOLUTIONS FOR SEMILINEAR ELLIPTIC SYSTEMS INVOLVING HARDY-SOBOLEV CRITICAL NONLINEARITY

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Abstract. This paper is concerned with a singular elliptic system, which involves the Hardy-Sobolev critical nonlinearity. The existence and multiplicity of solutions for this system are obtained by the variational methods.

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REFERENCES

- [1] C. O. ALVES, D. C. DE MORAIS FILHO, M. A. S. SOUTO, *On systems of elliptic equations involving subcritical or critical Sobolev exponents*, *Nonlinear Anal.*, **42** (2000), 771–787.
- [2] H. BRÉZIS, E. LIEB, *A relation between pointwise convergence of functions and convergence of functionals*, *Proc. Amer. Math. Soc.*, **88** (1983), 486–490.
- [3] H. BRÉZIS, L. NIRENBERG, *Positive solutions of nonlinear elliptic equations involving critical Sobolev exponents*, *Comm. Pure Appl. Math.*, **36** (1983), 437–477.
- [4] L. CAFFARELLI, R. KOHN, L. NIRENBERG, *First order interpolation inequality with weights*, *Compos. Math.*, **53** (1984), 259–275.
- [5] D. CAO, P. HAN, *Solutions for semilinear elliptic equations with critical exponents and Hardy potential*, *J. Differential Equat.*, **205** (2004), 521–537.
- [6] F. CATRINA, Z. WANG, *On the Caffarelli-Kohn-Nirenberg inequalities: Sharp constants, existence (and nonexistence), and symmetry of external functions*, *Comm. Pure Appl. Math.*, **54**, 2 (2001), 229–258.
- [7] K. CHOU, C. CHU, *On the best constant for a weighted Sobolev-Hardy inequality*, *J. London Math. Soc.*, **48**, 1 (1993), 137–151.
- [8] A. FERRERO, F. GAZZOLA, *Existence of solutions for singular critical growth semi-linear elliptic equations*, *J. Differential Equat.*, **177**, 2 (2001), 494–522.
- [9] L. HUANG, X. P. WU, C. L. TANG, *Existence and multiplicity of solutions for semilinear elliptic equations with critical weighted Hardy-Sobolev exponents*, *Nonlinear Anal.*, **71** (2009), 1916–1924.
- [10] X. J. HUANG, X. P. WU, C. L. TANG, *Multiple positive solutions for semilinear elliptic equations with critical weighted Hardy-Sobolev exponents*, *Nonlinear Anal.*, **74** (2011), 2602–2611.
- [11] D. KANG, S. J. PENG, *Existence and asymptotic properties of solutions to elliptic systems involving multiple critical exponents*, *Science China Math.*, **54**, (2) (2011), 243–256.
- [12] D. KANG, *On the elliptic problems with critical weighted Sobolev-Hardy exponents*, *Nonlinear Anal.*, **66**, 5 (2007), 1037–1050.
- [13] M. LIN, *Some further results for a class of weighted nonlinear elliptic equations*, *J. Math. Anal. Appl.*, **337**, 1 (2008), 537–546.
- [14] P. H. RABINOWITZ, *Minimax Methods in Critical Point Theory with Applications to Differential Equations*, in: *CBMS Reg. Conf. Series. Math.*, vol. 65, Amer. Math. Soc, Providence, RI, 1986.
- [15] B. XUAN, *The solvability of quasilinear Brezis-Nirenberg-type problems with singular weights*, *Nonlinear Anal.*, **62** (2005), 703–725.
- [16] L. WANG, Q. WEI, D. KANG, *Existence and multiplicity of positive solutions to elliptic systems involving critical exponents*, *J. Math. Anal. Appl.*, **383** (2011), 541–552.