

## Dr Yunbin Zhao PhD

Senior Lecturer in Mathematical Optimization

[School of Mathematics \(/schools/mathematics/index.aspx\)](/schools/mathematics/index.aspx)

### Contact details

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### About

Yunbin is a lecturer of theoretical and computational optimization. His main research interests include operations research, computational optimization, and numerical analysis. He has published over 42 research papers in scientific journals.

School web page: [web.mat.bham.ac.uk/Y.Zhao \(http://web.mat.bham.ac.uk/Y.Zhao\)](http://web.mat.bham.ac.uk/Y.Zhao)

### Qualifications

- PhD in Operations Research and Optimization, 1998
- MSc in Applied Mathematics, 1992
- BSc in Applied Mathematics, 1989

### Biography

Yunbin Zhao qualified with BSc in applied mathematics from the Northwestern Polytechnical University in 1989, and MSc in applied mathematics from the Chongqing University in 1992. He went to study PhD in operations research and optimization from Chinese Academy of Sciences in 1995. Before joining to the University of Birmingham in 2007, he worked at Chinese Academy of Sciences, and the University of Toronto.

### Teaching

- Single Honours Mathematics (G100, G103, G141)
- Mathematics Majors: Mathematics with Business Management (G1N2); Mathematics with Engineering (J920); Mathematics with Philosophy (G1V5)
- Joint Honours Mathematics: Mathematics & Computer Science (GG14); Pure Mathematics & Computer Science (GGC4)
- MSc in Mathematical Finance

### Postgraduate supervision

Yunbin is interested in supervising MSc and PhD research students in the following areas:

- Operations Research
- Computational Optimization
- Numerical Analysis and Mathematical Finance

If you are interested in studying any of these subject areas please contact Yunbin on the contact details above.

### Research

#### RESEARCH THEMES

Optimization theory, algorithms and applications to science and engineering.

### Publications

#### Selected publications

Y.B. Zhao (2014), Equivalence and strong equivalence between the sparsest and least  $l_1$ -norm nonnegative solutions of linear systems and their applications, *J. Oper. Res. Soc. China*, 2, pp. 171–193.

Y.B. Zhao (2013), RSP-Based analysis for sparsest and least  $l_1$ -norm solutions to underdetermined linear systems, *IEEE Transactions on Signal Processing*, 61, pp. 5777–5788.

Y.B. Zhao (2014), Equivalence and strong equivalence between the sparsest and least  $l_1$ -norm nonnegative solutions of linear systems and their applications, *J. Oper. Res. Soc. China*, 2, pp. 171–193.

Y.B. Zhao (2013), RSP-Based analysis for sparsest and least  $l_1$ -norm solutions to underdetermined linear systems, *IEEE Transactions on Signal Processing*, 61, pp. 5777-5788.

Y.B. Zhao (2013), New and improved conditions for uniqueness of sparsest solutions of underdetermined linear systems, *Applied Mathematics and Computation*, 224, pp. 58-73.

Y.B. Zhao and D. Li (2012), Reweighted  $l_1$ -minimization for sparse solutions to underdetermined linear systems, *SIAM Journal on Optimization*, 22, pp. 1065-1088.

Y.B. Zhao (2012), An approximation theory of matrix rank minimization and its application to quadratic equations, *Linear Algebra and its Applications*, 437, pp.77-93.

Y.B. Zhao (2011), Convexity conditions of Kantorovich function and related semi-infinite linear matrix inequalities, *Journal of Computational and Applied Mathematics*, 235, pp. 4389-4403.

Y.B. Zhao (2010), The convexity condition and Legendre-Fenchel transform of the product of finitely many quadratic forms, *Applied Mathematics and Optimization*, 62, pp. 411-434.

Y.B. Zhao (2010), The Legendre-Fenchel conjugate of the product of two positive-definite quadratic forms, *SIAM Journal on Matrix Analysis & Applications*, 31, pp.1792-1811.

Y.B. Zhao, S.C. Fang and J.E. Lavery (2008), Geometric dual formulation of the first derivative based  $C^1$ -smooth univariate cubic  $L_1$  spline functions, *Journal of Global Optimization*, 40, pp. 589-621.

I. Averbakh and Y.B. Zhao (2008), Explicit reformulations for robust optimization problems with general uncertainty sets, *SIAM Journal on Optimization*, 18, pp. 1436-1466

Y.B. Zhao (2007), Enlarging neighborhood of interior-point algorithms for linear programming via the least value of proximity functions, *Applied Numerical Mathematics*, 57, pp.1033-1049.

Y.B. Zhao and J.Hu (2007), Global bounds for the distance to solutions of co-coercive variational inequalities, *Operations Research Letters*, 35, pp. 409-415.

Y.B. Zhao, S.C. Fang and D. Li (2006), Constructing generalized mean functions via convex functions with regularity conditions, *SIAM Journal on Optimization*, 17, pp. 37-51.

J. Peng, T. Terlaky and Y.B. Zhao (2005), An interior point algorithm for linear optimization based on a proximity function, *SIAM Journal on Optimization*, 15, pp. 1105-1127.

Y.B. Zhao and D. Li (2003), A globally and locally convergent non-interior-point algorithm for  $P_0$  LCPs, *SIAM Journal on Optimization*, 13 (2003), no.4, 1195-1221

Y.B. Zhao and D. Li (2002), Locating the least 2-norm solution of linear programming via the path-following methods, *SIAM Journal on Optimization*, 12, pp. 893-912.

Y.B. Zhao and D. Li (2001), Existence and limiting behavior of a non-interior-point trajectory for CPs without strict feasibility condition, *SIAM Journal on Control and Optimization*, 40, pp. 898-924.

Y.B. Zhao and D. Li (2001), Monotonicity of fixed point and normal mappings associated with variational inequality and its application. *SIAM Journal on Optimization*, 11, pp. 962-973.

Y.B. Zhao and D. Li (2001), On a new homotopy continuation trajectory for nonlinear complementarity problems, *Mathematics of Operations Research*, 26, pp. 119-146.

Y.B. Zhao and G. Isac (2000), Properties of a multi-valued mapping associated with some non-monotone complementarity problems, *SIAM Journal on Control and Optimization*, 39, pp. 571-593.

