

Bibliography

- Abbass HA (2002) The self-adaptive Pareto differential evolution algorithm. In: Proceedings of the 2002 Congress on Evolutionary Computation, vol 1, pp 831–836.
- Abbass HA, Sarker R, Newton C (2001) PDE: A Pareto-frontier differential evolution approach for multiobjective optimization problems. In: Proceedings of the 2001 Congress on Evolutionary Computation, vol 2, pp 971–978.
- Adeli H, Cheng NT (1994) Augmented Lagrangian genetic algorithm for structural optimization. *Journal of Aerospace Engineering* 7:104–118.
- Alander JT (1992) On optimal population size of genetic algorithms. In: IEEE Proceedings on Computer Systems and Software Engineering, pp 65–70.
- Alexandre HFD, João ADV (2002) Multiobjective genetic algorithms applied to solve optimization problems. *IEEE Transactions on Magnetic* 38(2):1133–1136.
- Allenson R (1992) Genetic algorithms with gender for multi-function optimization. Report No. EPCC-SS92-01, Edinburgh Parallel Computing Center, Edinburgh, Scotland.
- Andrzej O, Stanislaw K (2000) A new constraint tournament selection method for multicriteria optimization using genetic algorithm. In: Proceedings of the 2000 Congress on Evolutionary Computation, pp 501–507.
- Angeline PJ, Pollack JB (1993) Competitive environments evolve better solutions for complex tasks. In: Proceedings of the Fifth International Conference on Genetic Algorithms, pp 264–270.
- Arabas J, Michalewicz Z, Mulawka J (1994) GAVaPS-A genetic algorithm with varying population size. In: Proceedings of the First Congress on Evolutionary Computation, vol 1, pp 73–74.
- Bäck T (1996) *Evolutionary Algorithms in Theory and Practice*. Oxford University Press, NY.
- Bagchi TP (1999) *Multiobjective Scheduling by Genetic Algorithm*. Kluwer Academic Publishers, Boston, MA.
- Bard JF, Kontoravdis G, Yu G (2002) A branch-and-cut procedure for the vehicle routing problem with time windows. *Transportation Science* 36(2):250–269.
- Beasley D, Bull DR, Martin RR (1993) A sequential niche technique for multimodal function optimization. *Journal of Evolutionary Computation* 1(2):101–125.
- Beasley JE, Christofides N (1997) Vehicle routing with a sparse feasibility graph. *European Journal of Operational Research* 98(3):499–511.
- Ben P, Rankin RC, Cumming A, Fogarty TC (1998) Timetabling the classes of an entire university with an evolutionary algorithm. In: A.E. Eiben, T. Back, M. Schoenauer, and H. Schwefel (eds) *Parallel Problem Solving from Nature V*, Lecture Notes in Computer Science No. 1498. Springer-Verlag, Amsterdam, Netherlands.
- Bent R, Van Hentenryck P (2001) A two-stage hybrid local search for the vehicle routing problem with time windows. Technical Report CS-01-06, Computer Science Department, Brown University, RI.

- Bentley PJ, Wakefield JP (1997) Finding acceptable solutions in the Pareto-optimal range using multiobjective genetic algorithms. In: Proceedings of the Second Online World Conference on Soft Computing in Engineering Design and Manufacturing (WSC2).
- Berger J, Barkaoui M, Bräysy O (2001) A parallel hybrid genetic algorithm for the vehicle routing problem with time windows. Working Paper, Defense Research Establishment Valcartier, Canada.
- Bertsimas D, Simchi-Levi D (1993) A new generation of vehicle routing research: Robust algorithms, addressing uncertainty. *Operations Research* 44(2):286–304.
- Box GE (1998) Scientific learning. In: Abraham B (ed) *Quality Improvement Through Statistical Methods*. Birkhäuser, Boston, pp 3–12.
- Borges CCH, Barbosa HJC (2000) A non-generational genetic algorithm for multiobjective optimization. In: Proceedings of the 2000 Congress on Evolutionary Computation, pp 172–179.
- Borghesani C, Chait Y, Yaniv O (1995) Quantitative feedback theory toolbox user manual. The Math Work Inc.
- Branke J (1999) Memory enhanced evolutionary algorithms for changing optimization problems. In: Proceedings of the 1999 Congress on Evolutionary Computation, vol 3, pp 1875–1882.
- Bräysy O (2003) A reactive variable neighborhood search algorithm for the vehicle routing problem with time windows. *INFORMS Journal on Computing* 15(4).
- Bräysy O, Gendreau M (2001a) Genetic algorithms for the vehicle routing problem with time windows. SINTEF Applied Mathematics, Internal Report STF42 A01021, Department of Optimisation, Oslo, Norway.
- Bräysy O, Gendreau M (2001b) Tabu search heuristics for the vehicle routing problem with time windows. SINTEF Applied Mathematics, Internal Report STF42 A01022, Department of Optimisation, Oslo, Norway.
- Breedam AV (2001) Comparing descent heuristic and metaheuristic for the vehicle routing problem. *Computer & Operations Research* 28(4):289–315.
- Bryant GF, Halikias GD (1995) Optimal loop-shaping for systems with large parameter uncertainty via linear programming. *International Journal in Control* 62(3):557–568.
- Burke EK, Newall JP (1999) A multi-stage evolutionary algorithm for the timetable problem. *IEEE Transactions on Evolutionary Computation* 3(1):63–74.
- Cantú-Paz E (1998) A survey of parallel genetic algorithms. *Calculateurs Paralleles, Réseaux et Systems Repartis* 10(2):141–171.
- Caseau Y, Laburthe F (1999) Heuristics for large constrained vehicle routing problems. *Journal of Heuristics* 5(3):281–303.
- Chait Y (1997) QFT loop-shaping and minimization of the high-frequency gain via convex optimization. In: Proceedings of Symposium on Quantitative Feedback Theory and Other Frequency Domain Method and Applications. Glasgow, Scotland, pp 13–28.
- Chambers JM, Cleveland WS, Kleiner B, Turkey PA (1983) *Graphical Methods for Data Analysis*. Wadsworth & Brooks/Cole, Pacific Grover, CA.
- Charnes A, Cooper WW (1961) *Management Models and Industrial Applications of Linear Programming*, vol 1. John Wiley & Sons, NY.
- Chavalitwongse W, Kim D, Pardalos PM (2003) GRASP with a new local search scheme for vehicle routing problems with time windows. *Journal of Combinatorial Optimization* 7(2):179–207.
- Chen CL, Neppalli RV, Aljabel N (1996) Genetic algorithms applied to the continuous flowshop problem. *Computers and Industrial Engineering* 30(4):919–929.

- Chen SJ, Hwang CL, Hwang FP (1992) Fuzzy Multiple Attribute Decision Making. Springer-Verlag, p 265.
- Chen WH, Balance DJ (1998) QFT design for uncertain nonminimum phase and unstable plants. In: Proceedings of the American Control Conference, vol 4, pp 2486–2590.
- Chen WH, Balance DJ, Li Y (1998) Automatic loop-shaping in QFT using genetic algorithms. In: Proceedings of the Third Asia-Pacific Conference on Control & Measurement, pp 63–67.
- Chen WH, Ballance DJ, Feng W, Li Y (1999) Genetic algorithm enabled computer-automated design of QFT control systems. In: IEEE International Conference on Control Applications and System Design, pp 492–497.
- Chiang RY, Safonov MG (1992) Robust Control Toolbox. The Mathworks, Inc.
- Chiang WC, Russel RA (1996) Simulated annealing metaheuristic for the vehicle routing problem with time windows. *Annals of Operations Research*, 63:3–27.
- Chiang WC, Russel RA (1997) A reactive tabu search metaheuristics for the vehicle routing problem with time windows. *INFORMS Journal on Computing* 9:417–430.
- Chipperfield AJ, Fleming PJ (1995) Gas turbine engine controller design using multiobjective genetic algorithms. In: Zalzala AMS (ed) Proceedings of the First IEE/IEEE International Conference on Genetic Algorithms in Engineering Systems: Innovations and Applications, pp 214–219.
- Chipperfield AJ, Fleming PJ (1996) Multiobjective gas turbine engine controller design using genetic algorithms. *IEEE Transactions on Industrial Electronics* 43(5):583–587.
- Chiu TC, Kempf C, Yao WH, Tomizuka M (1993) Compensation for repeatable and nonrepeatable tracking errors in disk file systems. In: JSME Conf. on Advanced Mechatronics, Tokyo, Japan.
- Christofides N, Mingozzi A, Toth P (1981) Exact algorithms for the vehicle routing problem based on spanning tree and shortest path relaxations. *Math. Programming* 20(3):255–282.
- Cingoski V, Kowata N, Kaneda K, Yamashita H (1997) Inverse shape optimization of a pole of rotating machines using dynamically adjustable genetic algorithms. *IEEE Transactions on Magnetics* 35:1686–1689.
- Coello Coello CA (1996) An empirical study of evolutionary techniques for multiobjective optimization in engineering design. Ph.D. thesis, Department of Computer Science, Tulane University, New Orleans, LA.
- Coello Coello CA (1998) An updated survey of GA-based multiobjective optimization techniques. Report No. Lania-RD-98-08, Laboratorio Nacional de Informatica Avanzada (LANIA), Xalapa, Veracruz, Mexico.
- Coello Coello CA, Pulido GT (2001) A micro-genetic algorithm for multiobjective optimization. In: Zitzler E, Deb K, Thiele L, Coello Coello CA, Corne D (eds) First International Conference on Evolutionary Multi-Criterion Optimization, Lecture Notes in Computer Science. Springer-Verlag, pp 126–140.
- Coello Coello CA, Cortés NC (2002) An approach to solve multiobjective optimization problems based on an artificial immune system. In: Timmis J, Bentley PJ (eds) First International Conference on Artificial Immune Systems (ICARIS'2002). University of Kent at Canterbury, Inglaterra, pp 212–221.
- Coello Coello CA, Lechuga MS (2002) MOPSO: A proposal for multiple objective particle swarm optimization. In: Proceedings of the 2002 Congress on Evolutionary Computation, vol 2, pp 1051–1056.

- Coello Coello CA, Bécerra RL (2003) Evolutionary multiobjective optimization using a cultural algorithm. In: 2003 IEEE Swarm Intelligence Symposium Proceedings. Indianapolis, IN, pp 6–13.
- Collard P, Escazut C (1995) Genetic operators in a dual genetic algorithm. In: International Conference on Tools and Artificial Intelligence pp 12–19.
- Cook W, Rich JL (1999) A parallel cutting plan algorithm for the vehicle routing problem with time windows. Technical Report, Computational and Applied Mathematics Department, Rice University, Houston, TX.
- Cordeau JF, Gendreau M, Laporte G, Potvin JY, Semet F (2002) A guide to vehicle routing heuristics. *Journal of the Operational Research Society* 53(5):512–522.
- Cordeau JF, Laporte G, Mercier A (2001) A unified tabu search heuristic for vehicle routing problems with time windows. *Journal of the Operational Research Society* 52(8):928–936.
- Cordone R, Wolfler-Calvo R (2001) A heuristic for the vehicle routing problem with time windows. *Journal of Heuristics* 7(2):107–129.
- Corne DW, Knowles JD, Oates MJ (2000) The Pareto envelope-based selection algorithm for multiobjective optimization. In: Schoenauer M, Deb K, Rudolph G, Yao X, Lutton E, Merelo JJ, Schwefel HP (eds) *Proceedings of the Parallel Problem Solving from Nature VI Conference*. Springer, pp 839–848.
- Corne DW, Jerram NR, Knowles JD, Oates MJ (2001) PESA-II: Region-based selection in evolutionary multiobjective optimization. In: Spector L, Goodman E, Wu A, Langdon WB, Voigt HM, Gen M, Sen S, Dorigo M, Pezeshek S, Garzon MH, Burke E (eds) *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2001)*. Morgan Kaufmann Publishers, pp 283–290.
- Corne DW, Deb K, Fleming PJ, Knowles JD (2003) The good of the many outweighs the good of the one: Evolutionary multiobjective optimization. *The Newsletter of the IEEE Neural Networks Society* 1(1):9–13.
- Cvetkovic D, Parmee IC (1998) Evolutionary design and multiobjective optimization. In: *The Sixth European Congress on Intelligent Techniques and Soft Computing (EUFIT'98)*. Aachen, Germany, pp 397–401.
- Cvetkovic D, Parmee IC (1999) Genetic algorithm-based multiobjective optimization and conceptual engineering design. In: *Proceedings of the 1999 Congress on Evolutionary Computation*, vol 1, pp 29–36.
- Cvetkovic D, Parmee IC (2002) Preferences and their application in evolutionary multiobjective optimization. *IEEE Transactions on Evolutionary Computation* 6(1):42–57.
- Czech ZJ, Czarnas P (2002) A parallel simulated annealing for the vehicle routing problem with time windows. In: *Proceedings of the 10th Euromicro Workshop on Parallel, Distributed and Network-based Processing*. Canary Islands, Spain, pp 376–383.
- D'Azzo, Houpis H (1995) *Linear Control System Analysis and Design: Conventional and Modern*, 4th edition. McGraw-Hill, NY.
- Dahleh MA, Diaz-Bobillo I (1995) *Control of Uncertain Systems: A Linear Programming Approach*. Prentice-Hall, Englewood Cliffs, NJ.
- David AVV, and Gary BL (2000) Multiobjective evolutionary algorithms: Analyzing state of the art. *Journal of Evolutionary Computation* 8(2):125–147.
- Davidor Y (1991) *Epistasis Variance: A Viewpoint on GA-hardness*. Morgan Kaufmann, San Mateo, CA, pp 23–35.

- De Backer B, Furnon V, Kilby P, Prosser P, Shaw P (2002) Solving vehicle routing problems using constraint programming and metaheuristics. *Journal of Heuristics* 6(4):501–523.
- De Jong KA (1975) Analysis of the behavior of a class of genetic adaptive systems. Ph.D thesis, Department of Computer and Communication Sciences, University of Michigan, Ann Arbor, MI.
- Deb K (1999a) Construction of test problems for multiobjective optimization. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-99)*, vol 1, pp 164–171.
- Deb K (1999b) Multiobjective genetic algorithms: Problem difficulties and construction of test problem. *Evolutionary Computation* 7(3):205–230.
- Deb K (2001) *Multiobjective Optimization Using Evolutionary Algorithms*. John Wiley & Sons, NY.
- Deb K, Goldberg DE (1989) An investigation on niche and species formation in genetic function optimization. In: Schaffer JD (ed) *Proceedings of the Third International Conference on Genetic Algorithms*. Morgan Kaufmann, San Mateo, CA, pp 42–50.
- Deb K, Pratap A, Agarwal S, Meyarivan T (2002a) A fast and elitist multiobjective genetic algorithm: NSGA-II. *IEEE Transactions on Evolutionary Computation* 6(2):182–197.
- Deb K, Thiele L, Laumanns M, Zitzler Z (2002b) Scalable multiobjective optimization test problems. In: *Proceedings of the 2002 Congress on Evolutionary Computation*, pp 825–830.
- Dengiz B, Altiparmak F, Smith AE (1997) Local search genetic algorithm for optimal design of reliable networks. *IEEE Transactions on Evolutionary Computation* 1(3):179–188.
- Desrochers M, Desrosiers J, Solomon M (1992) A new optimization algorithm for the vehicle routing problem with time windows. *Operational Research* 40(2):342–354.
- Desrosier J, Dumas Y, Solomon M, Soumis F (1995) Time constraint routing and scheduling. In: Ball M (ed) *Handbooks in Operations Research and Management Science 8: Network Routing*. Elsevier Science Publishers, Amsterdam, pp 35–139.
- Devore J, Peck R (1997) *Statistics: The Exploration and Analysis of Data*. Duxbury Press, London.
- Diggelen F, Glover KA (1992) Hadamard weighted loop shaping design procedure. In: *Proceedings of the 31st Conference on Decision and Control*, pp 2193–2198.
- Dorndorf U, Pesch E (1995) Evaluation based learning in a jobshop scheduling environment. *Computers and Operations Research* 22:25–40.
- Doyle JC, Stein G (1981) Multivariable feedback design: Concepts for a classical/modern synthesis. *IEEE Transactions on Automatic Control* 26:4–16.
- Doyle JC, Francis B, Tannenbaum A (1992) *Feedback Control Theory*. Macmillan Publishing Company, NY.
- Dullaert W, Janssens GK, Sörensen K, Vernimmen B (2002) New heuristics for the fleet size and mix vehicle routing problem with time windows. *Journal of the Operational Research Society* 53(11):1232–1238.
- Esquivel S, Ferrero S, Gallard R, Salto C, Alfonso H, Schütz M (2002) Enhanced evolutionary algorithms for single and multiobjective optimization in the job scheduling problem. *Knowledge-Based Systems* 15(1–2):13–25.
- Everson RM, Fieldsend JE, Singh S (2002) Full elite sets for multiobjective optimization. In: Parmee IC (ed) *Proceedings of the Fifth International Conference on Adaptive Computing Design and Manufacture (ACDM 2002)*. Springer-Verlag, pp 343–354.

- Fisher ML (1995) Vehicle routing. In: Ball M (ed) *Handbooks in Operations Research and Management Science 8: Network Routing*. Elsevier Science Publishers, Amsterdam, pp 1–33.
- Fleming PJ, Chipperfield AJ (1998a) Evolutionary algorithms for multiple criteria decision making in control. In: *IFAC Workshop on Nonsmooth and Discontinuous Problems of Control and Optimization NDPCO 98*, pp 17–20.
- Fleming PJ, Chipperfield AJ (1998b) Genetic algorithms and multiobjective optimization in control applications. In: *Proceedings Symposium on Intelligent Systems in Control and Measurement*. Miskolc, Hungary.
- Fonseca CM (1995) Multiobjective genetic algorithms with application to control engineering problems. Ph.D. thesis, Dept. Automatic Control and Systems Eng., University of Sheffield, Sheffield, UK.
- Fonseca CM, Fleming PJ (1993) Genetic algorithm for multiobjective optimization: Formulation, discussion and generalization. In: Forrest S (ed) *Proceeding of the Fifth International Conference on Genetic Algorithms*. Morgan Kaufmann, San Mateo, CA, pp 416–423.
- Fonseca CM, Fleming PJ (1994) Multiobjective optimal controller design with genetic algorithms. In: *Proceedings on IEE Control*, pp 745–749.
- Fonseca CM, Fleming PJ (1995a) An overview of evolutionary algorithms in multiobjective optimization. *Journal of Evolutionary Computation* 3(1):1–16.
- Fonseca CM, Fleming PJ (1995b) Multiobjective genetic algorithm made easy: Selection, sharing and mating restriction. In: *International Conference on Genetic Algorithm in Engineering Systems: Innovations and Application*. UK, pp 12–14.
- Fonseca CM, Fleming PJ (1997) Multiobjective optimization. In: Bäck T, Fogel D, Michalewicz Z (eds) *Handbook of Evolutionary Computation*. Oxford University Press, England, vol 1, pp C4.5:1–C4.5:9.
- Fonseca CM, Fleming PJ (1998a) Multiobjective optimization and multiple constraint handling with evolutionary algorithms—part I: A unified formulation. *IEEE Transactions on System, Man, and Cybernetics—Part A: Systems and Humans* 28(1):26–37.
- Fonseca CM, Fleming PJ (1998b) Multiobjective optimization and multiple constraint handling with evolutionary algorithms—part II: Application example. *IEEE Transactions on System, Man, and Cybernetics—Part A: Systems and Humans* 28(1):38–47.
- Forrest S, Javornik B, Smith RE, Perelson AS (1993) Using genetic algorithms to explore pattern recognition in the immune system. *Journal of Evolutionary Computation* 1(3):191–211.
- Fourman MP (1985) Compaction of symbolic layout using genetic algorithms. In: *Proceedings of the First International Conference on Genetic Algorithms: Genetic Algorithms and Their Applications*. Lawrence Erlbaum, pp 141–153.
- Franklin GF, Powell JD, Workman ML (1998) *Digital Control of Dynamic Systems*, 3rd edition. Addison-Wesley, Reading, MA.
- Fujita K, Hirokawa N, Akagi S, Kitamura S, Yokohata H (1998) Multiobjective design automotive engine using genetic algorithm. In: *Proceedings of 1998 ASME Design Engineering Technical Conferences*. Atlanta, GA, pp 1–11.
- Gehring H, Homberger J (2001) A parallel two phase metaheuristic for routing problems with time windows. *Asia-Pacific Journal of Operation Research* 18(1):35–47.

- Gehring H, Homberger J (2002) Parallelization of a two-phase metaheuristic for routing problems with time windows. *Journal of Heuristics* 3(8):251–276.
- Gendreau M, Laporte G, Potvin JY (1999) Metaheuristics for the vehicle routing problem. University of Montreal, Canada, Les Cahiers du GERAD G-98-52.
- Gezduur A, Türkay M (2002) MILP solution to the vehicle routing problem with time windows and discrete vehicle capacities. In: XXIII National Operations Research and Industrial Engineering Congress. Istanbul, Turkey.
- Glover K, Doyle JC (1988) State-space formulae for all stabilizing controllers that satisfy an H_∞ norm bound and relations to risk sensitivity. *Sys. and Contr. Letters* 11:169–172.
- Goh TB (1999) Development of a dual actuator controller in hard disk drives. Master thesis, Department of Electrical Engineering, National University of Singapore.
- Goh TB, Li ZM, Chen BM, Lee TH, Huang T (1999) Design and implementation of a hard disk drive servo system using robust and perfect tracking approach. In: Proc. 31st CDC. Phoenix, AZ, pp 5247–5252.
- Goh TB, Li ZM, Chen BM, Lee TH, Huang T (2001) Design and implementation of a hard disk drive servo system using robust and perfect tracking approach. *IEEE Trans. on Cont. Syst. Tech* 9(2):221–233.
- Goldberg DE (1989a) *Genetic Algorithms in Search, Optimization, and Machine Learning*. Addison-Wesley, Reading, MA.
- Goldberg DE (1989b) Sizing populations for serial and parallel genetic algorithms. In *Proceedings of the Third International Conference on Genetic Algorithms*. Morgan Kaufmann, San Mateo, CA, pp 70–79.
- Goldberg DE, Lingle R (1985) Alleles, loci and the traveling salesman problem. In: *The First International Conference on Genetic Algorithms*. Lawrence Erlbaum, Hillsdale, NJ, pp. 154–159.
- Goldberg DE, Richardson J (1987) Genetic algorithms with sharing for multi-modal function optimization. In: *Proceedings of the 2nd International Conference on Genetic Algorithms*, pp. 41–49.
- Golden BL, Assad AA (1988) *Vehicle Routing: Methods and Studies*. North-Holland, Amsterdam, Netherlands.
- Greenwood GW, Hu X, D'Ambrosio JG (1996) Fitness functions for multiple objective optimization problems: Combining preferences with Pareto rankings. In: *Foundations of Genetic Algorithms 4 (FOGA-96)*. Morgan Kaufmann, San Mateo, pp 437–455.
- Grefenstette JJ (1984) GENESIS: A system for using genetic search procedures. In: *Proceedings of the Conference on Intelligent Systems and Machines*, pp 161–165.
- Grefenstette JJ (1986) Optimization of control parameters for genetic algorithms. *IEEE Transactions on Systems, Man and Cybernetics* 16(1):122–128.
- Grefenstette JJ, Gopal R, Rosmaita B, Van Gucht D (1985) Genetic algorithms for the traveling salesman problem. In: *The First International Conference on Genetic Algorithms and Their Applications*, pp 160–168.
- Guan KX, MacCallum KJ (1996) Adopting a minimum commitment principle for computer aided geometric design systems. In: Gero JS, Sudweeks F (eds) *Artificial Intelligence in Design '96*. Kluwer Academic Publishers, pp 623–639.
- Hagiwara M (1993) Pseudo-hill climbing genetic algorithm (PHGA) for function optimization. In: *Proceedings of International Joint Conference on Neural Networks*, vol 1, pp 713–716.

- Hajela P, Lin CY (1992) Genetic search strategies in multicriterion optimal design. *Journal of Structural Optimization* 4:99–107.
- Hanselmann H, Engelke A (1988) LQG-control of a highly resonant disk drive head positioning actuator. *IEEE Trans. on Ind. Elecs.* 35(1):100–104.
- Harik G (1995) Finding multimodal solutions using restricted tournament selection. In: Eshelman LJ (ed) *Proceedings of the 6th International Conference on Genetic Algorithms*. Morgan Kaufmann, San Mateo, CA, pp 24–31.
- Hirata M, Liu KZ, Mita T, Yamaguchi T (1992) Head positioning control of a hard disk drive using H_∞ theory. In: *Proc. 31st CDC*, vol 1, pp 2460–2461.
- Hirata M, Atsumi T, Murase A, Nonami K (1999) Following control of a hard disk drive by using sampled-data H_∞ control. In: *Proc. IEEE Int. Conf. on Cont. Appl.*, Hawaii, pp 182–186.
- Hiroyasu T, Miki M, Watanabe S (1999) Distributed genetic algorithm with a new sharing approach in multiobjective optimization problems. In: *Proceedings of the 1999 Congress on Evolutionary Computation*, vol 1, pp 69–76.
- Ho WK, Chin HJ, Lim A (2001) A hybrid search algorithm for the vehicle routing problem with time windows. *International Journal on Artificial Intelligence Tools* 10:431–449.
- Hoagland AS (1991) *Digital Magnetic Recording*. Wiley, NY.
- Holland JH (1975) *Adaptation in Natural and Artificial Systems*. University of Michigan Press, Ann Arbor, MI.
- Homberger J, Gehring H (1999) Two evolutionary metaheuristic for the vehicle routing problem with time windows. *INFOR* 37(1):297–318.
- Horn J (1997) Multicriterion decision making. In: Bäck T, Fogel D, Michalewicz Z (eds) *Handbook of Evolutionary Computation*. Oxford University Press, Oxford, vol 1, pp F1.9:1–F1.9:15.
- Horn J, Nafpliotis N (1993) Multiobjective optimization using the niched Pareto genetic algorithm. Report No. 930005. Illinois Genetic Algorithms Laboratory (IlligAL), University of Illinois at Urbana–Champaign.
- Horn J, Nafpliotis N, Goldberg DE (1994) A niched Pareto genetic algorithm for multiobjective optimization. In: *Proceedings of the 1994 Congress on Evolutionary Computation*, vol 1, pp 82–87.
- Horowitz I (1982) Quantitative feedback theory. In: *IEE Proceedings, Pt. D*, 129(6):215–226.
- Horowitz I (1992) *Quantitative feedback design theory (QFT)*. QFT Publications, Colorado, vol 1.
- Horowitz I, Sidi M (1978) Optimum synthesis of nonminimum-phase feedback systems with plant uncertainties. *International Journal of Control* 27:361–386.
- Houck CR, Joines JA, Kay MG (1995) A genetic algorithm for function optimization: A Matlab implementation. NCSU-IE Technical Report 9509, North Carolina State University.
- Houpis CH (1993) Quantitative feedback theory (QFT) technique. In: Levine WS (ed) *The Control Handbook*. CRC Press and IEEE Press, pp 701–717.
- Houpis CH, Rasmussen SJ (1999) *Quantitative Feedback Theory: Fundamentals and Applications*. Marcel Dekker, Inc., NY.
- Hwang CL, Masud ASM (1979) *Multiple Objective Decision Making—Methods and Applications*. Springer-Verlag, NY.
- Ijiri Y (1965) *Management goals and accounting for control*. North-Holland, Amsterdam, Netherlands.

- Ioannou G, Kritikos M, Prastacos G (2001) A greedy look ahead heuristic for the vehicle routing problem with time windows. *Journal of the Operational Research Society* 52(5):523–537.
- Ishibashi H, Aguirre H, Tanaka K, Sugimura T (2000) Multiobjective optimization with improved genetic algorithm. In: *IEEE International Conference on Systems, Man, and Cybernetics (SMC2000)*. Nashville, TN, pp 3852–3857.
- Jakob WM, Gorges-Schleuter, Blume C (1992) Application of genetic algorithms to task planning and learning. In: Männer R, Nanderick B (eds) *Parallel Problem Solving from Nature, the 2nd Workshop*, Lecture Notes in Computer Science. North-Holland Publishing Company, Amsterdam, pp 291–300.
- Jaszkiewicz A (1998) Genetic local search for multiple objective combinatorial optimization. Report No. RA-014/98. Institute of Computing Science, Poznan University of Technology.
- Jaszkiewicz A (2001) Multiple objective metaheuristic algorithms for combinatorial optimization. Habilitation thesis 360. Poznań University of Technology, Poznan,
- Jin Y, Okabe T, Sendhoff B (2001) Dynamic weighted aggregation for evolutionary multiobjective optimization: Why does it work and how? In: Spector L, Goodman E, Wu A, Langdon WB, Voigt HM, Gen M, Sen S, Dorigo M, Pezeshek S, Garzon MH, Burke E (eds) *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2001)*. Morgan Kaufmann Publishers, San Mateo, CA, pp 1042–1049.
- Joos HD, Finsterwalder R (1999) Multiobjective design assessment and control law synthesis tuning for flight control development. In: *IEEE International Conference on Control Application and System Design*. Hawaii, pp 433–438.
- Jozefowicz N, Semet F, Talbi E (2002) Parallel and hybrid models for multiobjective optimization: Application to the vehicle routing problem. In: *Parallel Problem Solving from Nature*, Lecture Notes in Computer Science. Springer-Verlag, NY, pp 271–282.
- Jung S, Moon BR (2002) A hybrid genetic algorithm for the vehicle routing problem with time windows. In: *The Genetic and Evolutionary Computation Conference*. Morgan Kaufmann Publishers, San Mateo, CA, pp 1309–1316.
- Jutler H (1967) Linijnajna model z nieskolkimi celevymi funkcijami (linear model with several objective functions). *Ekonomika i matematiceckije Metody* 3 (in Polish), pp 397–406.
- Kadrovach BA, Zydallis JB, Lamont GB (2002) Use of Mendelian pressure in a multiobjective genetic algorithm. In: *Proceedings of the 2002 Congress on Evolutionary Computation*, vol 1, pp 962–967.
- Kallehauge B, Larsen J, Madsen OBG (2001) Lagrangean duality applied on vehicle routing with time windows. Technical Report IMM-TR-2001-9. IMM, Technical University of Denmark.
- Keeney RL, Raiffa H (1976) *Decisions with Multiple Objectives: Preferences and Value Tradeoffs*. Wiley, NY.
- Keerativuttiumrong N, Chaiyaratana N, Varavithya V (2002) Multiobjective cooperative coevolutionary genetic algorithm. In: *Parallel Problem Solving from Nature—PPSN VII*, Lecture Notes in Computer Science No. 2439. Springer-Verlag, NY, pp 288–297.
- Khan JA, Sait SM, Minhas MR (2002) Fuzzy bilevel simulated evolution for multiobjective VLSI placement. In: *Proceedings of the 2002 Congress on Evolutionary Computation*, vol 2, pp 1642–1647.

- Khan N, Goldberg DE, Pelikan M (2002) Multiobjective Bayesian optimization algorithm. In: Proceedings of the Genetic and Evolutionary Computation Conference (GECCO'2002). Morgan Kaufmann Publishers, San Mateo, CA, pp 684.
- Khor EF, Tan KC, Wong ML, Lee TH (2000) Evolutionary algorithm with dynamic population size for multiobjective optimization. In: The Third Asia Conference on Simulated Evolution and Learning (SEAL2000), pp 2768–2772.
- Khor EF, Tan KC, Lee TH (2001a) Multiobjective evolutionary optimization with non-stationary search space. In: Proceedings of the 2001 Congress on Evolutionary Computation. Seoul, Korea, pp 527–535.
- Khor EF, Tan KC, Lee TH (2001b) Tabu-based exploratory evolutionary algorithm for effective multiobjective optimization. In: The First Conference on Evolutionary Multi-Criterion Optimization (EMO'01), pp 344–358.
- Kilby PJ, Prosser P, Shaw P (1999) Guided local search for the vehicle routing problem with time windows. In: Meta Heuristics: Advances and Trends in Local Search Paradigms for Optimization. Kluwer Academic Publishers, pp 473–486.
- Kilby PJ, Prosser P, Shaw P (2000) A comparison of traditional and constraint-based heuristic methods on vehicle routing problems with side constraints. *Journal of Constraints* 5(4):389–414.
- Kita H, Yabumoto Y, Mori N, Nishikawa Y (1996) Multiobjective optimization by means of the thermodynamical genetic algorithm. In: Voigt HM (ed) The 4th International Conference on Parallel Problem Solving from Nature. Springer, NY, pp 504–512.
- Kiyota T, Tsuji Y, Kondo E (2003) Unsatisfying functions and multiobjective fuzzy satisficing design using genetic algorithms. *IEEE Transactions on Systems, Man, and Cybernetics—Part B* 33(6):889–897.
- Knowles JD, Corne DW (1999) The Pareto archived evolution strategy: A new baseline algorithm for multiobjective optimization. In: Proceedings of the 1999 Congress on Evolutionary Computation, pp 98–105.
- Knowles JD, Corne DW (2000a) Approximating the nondominated front using Pareto archived evolutionary strategy. *Evolutionary Computation* 8(2):149–172.
- Knowles JD, Corne DW (2000b) M-PAES: A memetic algorithm for multiobjective optimization. In: Proceedings of the 2000 Congress on Evolutionary Computation, pp 325–333.
- Knowles JD, Corne DW (2003) Properties of an adaptive archiving algorithm for storing nondominated vectors. *IEEE Transactions on Evolutionary Computation* 7(2):100–116.
- Kohl N, Desrosiers J, Madsen OBG, Solomon MM, Soumis F (1999) 2 path cuts for the vehicle routing problem with time windows. *Transportation Science* 33(1):101–116.
- Kursawe F (1990) A variant of evolution strategies for vector optimization. In: Proceedings of the First Conference on Parallel Problem Solving from Nature, pp 193–197.
- Lahanas M, Baltas D, Zamboglou N (2003) A hybrid evolutionary algorithm for multiobjective anatomy-based dose optimization in high-dose-rate brachytherapy. *Physics in Medicine and Biology* 48:399–415.
- Laporte G (1992) The vehicle routing problem: An overview of exact and approximate algorithms. *European Journal of Operational Research* 59(3):345–358.
- Laporte G, Gendreau M, Potvin JY, Semet F (2000) Classical and modern heuristics for the vehicle routing problem. *International Transaction in Operational Research* 7:285–300.

- Lau HC, Lim YF, Liu QZ (2001) Diversification of search neighborhood via constraint-based local search and its applications to VRPTW. In: *The Third International Workshop on Integration of AI and OR Techniques (CP-AI-OR)*. Kent, UK, pp 1–15.
- Lau HC, Sim M, Teo KM (2003) Vehicle routing problem with time windows and a limited number of vehicles. *European Journal of Operational Research* 148(3):559–569.
- Laumanns M, Rudolph G, Schwefel HP (1998) A spatial predator–prey approach to multiobjective optimization: A preliminary study. In: Eiben AE, Schoenauer M, Schwefel HP (eds) *Parallel Problem Solving From Nature—PPSN V*. Springer-Verlag, Holland, pp 241–249.
- Lee LH, Tan KC, Ou K, and Chew YH (2003) Vehicle capacity planning system (VCPS): A case study on vehicle routing problem with time windows. *IEEE Transactions on Systems, Man and Cybernetics—Part A (Systems and Humans)* 33(2):169–178.
- Li H, Lim A (2002) Local search with annealing-like restarts to solve the vehicle routing problem with time windows. In: *ACM Symposium on Applied Computing (SAC 2002)*, pp 560–565.
- Li X (2003) A real-coded predator–prey genetic algorithm for multiobjective optimization. In: Fonseca CM, Fleming PJ, Zitzler E, Deb K, Thiele L (eds) *Evolutionary Multi-Criterion Optimization: The Second International Conference (EMO2003)*, Lecture Notes in Computer Science 2632. Springer, pp 207–221.
- Li Y, Tomizuka M (1999) Two-degree-of-freedom control with robust feedback control for hard disk servo systems. *IEEE/ASME Trans. on Mechatronics* 4(1):17–24.
- Li Y, Tan KC, Ng KC, Murray-Smith DJ (1995) Performance-based linear control system design by genetic algorithm with simulated annealing. In: *Proceedings of the 34th Conference on Decision and Control*. New Orleans, LA, pp 731–736.
- Li Y, Tan KC, Marionneau C (1996) Direct design of linear control systems from plant I/O data using parallel evolutionary algorithms. In: *International Conference on Control'96, Special Session on Evolutionary Algorithms for Control Engineering*. University of Exeter, UK, pp 680–686.
- Limebeer DJN (1991) The specification and purpose of a controller design case study. In: *Proceedings of the 30th Conference on Decision and Control*. Brighton, England, pp 1579–1580.
- Limebeer DJ, Kasenally EM, Perkins JD (1993) On the design of robust two degree of freedom controllers. *Automatica: The Journal of IFAC* 29(1):157–168.
- Lin S (1965) Computer solutions for traveling salesman problem. *Bell System Technical Journal* 44:2245–2269.
- Liong SY, Khu ST, Chan WT (1998) Novel application of genetic algorithm and neural network in water resources: Development of Pareto front. In: *The Eleventh Congress of the IAHR-APD*, pp 185–194.
- Lis J, Eiben AE (1997) A multi-sexual genetic algorithm for multiobjective optimization. In: *Proceedings of the 1997 Congress on Evolutionary Computation*, pp 59–64.
- Liu TH, Mills KJ (1998) Robotic trajectory control system design for multiple simultaneous specifications: Theory and experimentation. *Transactions on ASME* 120:520–523.
- Liu Y, Yao X, et al. (2001) Scaling up fast evolutionary programming with cooperative coevolution. In: *Proceedings of the 2001 Congress on Evolutionary Computation*, vol 2, pp 1101–1108.

- Lohn JD, Kraus WF, Haith GL (2002) Comparing a coevolutionary genetic algorithm for multiobjective optimization. In: Proceedings of the 2002 Congress on Evolutionary Computation, vol 2, pp 1157–1162.
- Louis SJ, Yin X, Yuan ZY (1999) Multiple vehicle routing with time windows using genetic algorithms. In: Proceedings of the 1999 Congress on Evolutionary Computation, pp 1804–1808.
- Lu H, Yen GG (2002a) Rank-density based multiobjective genetic algorithm. In: Proceedings of the 2002 Congress on Evolutionary Computation, vol 1, pp 944–949.
- Lu H, Yen GG (2002b) Dynamic population size in multiobjective evolutionary algorithms. In: Proceedings of the 2002 Congress on Evolutionary Computation, vol 2, pp 1648–1653.
- Luh GC, Chueh CH, Liu WW (2003) MOIA: Multiobjective immune algorithm. *Engineering Optimization* 35(2):143–164.
- Luus R, Hartig F, Keil FJ (1995) Optimal drug scheduling of cancer chemotherapy by direct search optimization. *Hungarian Journal of Industrial Chemistry Veszprém* 23:55–58.
- Maciejowski JM (1989) *Multivariable Feedback Design*. Addison-Wesley, Reading, MA.
- Madavan NK (2002) Multiobjective optimization using a Pareto differential evolution approach. In: Proceedings of the 2002 Congress on Evolutionary Computation, vol 2, pp 1145–1150.
- Mahfoud SW (1995) Niching methods for genetic algorithms. Ph.D. thesis, University of Illinois, Urbana-Champaign.
- Man KF, Tang KS, Kwong S, Halang WA (1998) *Evolutionary Algorithms for Control and Signal Processing*. Springer, NY.
- Mao J, Hirasawa K, Hu J, Murata J (2001) Genetic symbiosis algorithm for multiobjective optimization problems. In: Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2001). Morgan Kaufmann Publishers, San Mateo, CA, p 771.
- Marcu TA (1997) Multiobjective evolutionary approach to pattern recognition for robust diagnosis of process faults. In: International Conference on IFAC Fault Detection, Supervision and Safety for Technical Processes, pp 1183–1188.
- Mariano CE, Morales EF (2000) Distributed reinforcement learning for multiple objective optimization problems. In: Proceedings of the 2000 Congress on Evolutionary Computation, vol 1, pp 188–194.
- McMullen PR (2001) An ant colony optimization approach to addressing a JIT sequencing problem with multiple objectives. *Artificial Intelligence in Engineering* 15:309–317.
- Merz P, Freisleben B (1998) On the effectiveness of evolutionary search in high-dimensional NK-landscape. In: Proceedings of the 1998 Congress on Evolutionary Computation, vol 1, pp 741–745.
- Michalewicz Z, Schoenauer M (1996) Evolutionary algorithms for constrained parameter optimization problems. *Evolutionary Computation* 4(1):1–32.
- Miller BL, Shaw MJ (1996) Genetic algorithms with dynamic niche sharing for multimodal function optimization. In: Proceedings of the 1996 Congress on Evolutionary Computation, pp 786–791.
- Molyneaux AK, Leyland GB, Favrat D (2001) A new clustering evolutionary multiobjective optimization technique. In: Proceedings of the Third International Symposium on Adaptive Systems—Evolutionary Computation and Probabilistic Graphical Models. Institute of Cybernetics, Mathematics and Physics, Havana, Cuba, pp 41–47.

- Moriarty DE (1997) Symbiotic evolution of neural networks in sequential decision tasks. Ph.D. thesis, The University of Texas at Austin.
- Morse JN (1980) Reducing the size of the nondominated set: Pruning by clustering. *Comput. Oper. Res.* 7(1–2).
- Murata T, Ishibuchi H (1995) MOGA: Multiobjective genetic algorithms. In: *Proceedings of the 1995 Congress on Evolutionary Computation*, vol 1, pp 289–294.
- Murata T, Ishibuchi H (1996) Performance evaluation of genetic algorithms for flow shop scheduling problems. *Computers and Industrial Engineering* 30(4):1061–1071.
- Neef M, Thierens D, Arciszewski H (1999) A case study of a multiobjective recombinative genetic algorithm with coevolutionary sharing. In: *Proceedings of the 1999 Congress on Evolutionary Computation*, pp 796–803.
- Ng WY (1989) Interactive multiobjective programming as a framework for computer-aided control system design. *Lecture Notes in Control and Information Sciences*, Springer-Verlag, NY.
- Nye WT, Tits AL (1986) An application-oriented, optimization-based methodology for interactive design of engineering systems. *International Journal on Control* 43:1693–1721.
- Oliver IM, Smith DJ, Holland JRC (1987) A study of permutation crossover operators on the traveling salesman problem. In: *Proceedings of the Second ICGA*. Lawrence Erlbaum Associates, Hillsdale, NJ, pp 224–230.
- Osman IH, Christofides N (1989) Simulated annealing and descent algorithms for capacitated clustering problem. Research Report, Imperial College, University of London.
- Osyczka A (1985) Multicriteria optimization for engineering design. In: , Gero JS (ed) *Design Optimization*. Academic Press, Cambridge, MA, pp 193–227.
- Paquete LF, Fonseca CM (2001) A study of examination timetabling with multiobjective evolutionary algorithms. In: *Metaheuristics International Conference*. Porto, Portugal.
- Pareto V (1896) *Cours D'Economie Plitique*. vol. 1 and 2, Lausanne:F. Rouge.
- Parmee IC, Watson AH (1999) Preliminary airframe design using co-evolutionary multiobjective genetic algorithms. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO'99)*, vol 2, pp 1657–1665.
- Pétrowski A (1996) A clearing procedure as a niching method for genetic algorithms. In: *Proceedings of the 1996 Congress on Evolutionary Computation*. Nagoya, Japan, pp 798–803.
- Pinaki M, Elizabeth MR (1999) Genetic algorithms for VLSI design, layout & test automation. Prentice-Hall, Englewood Cliffs, NJ.
- Pohlheim H (1998) GEATbx: Genetic and evolutionary algorithm toolbox for use with Matlab—documentation and source. Technical Report.
- Poloni C et al. (2000) Hybridization of a multiobjective genetic algorithm: A neural network and a classical optimizer for a complex design problem in fluid dynamics. *Computer Methods in Applied Mechanics and Engineering* 186(2–4):403–420.
- Postlethwaite I, Lin JL, Gu DW (1991) Robust control of a high purity distillation column using Mu-K iteration. In: *Proceedings of the 30th Conference on Decision and Control*, pp 1586–1590.
- Potter MA, De Jong KA (1994) A cooperative coevolutionary approach to function optimization. In: *Proceedings of the Parallel Problem Solving from Nature III Conference (PPSN III)*. Berlin, Germany, pp 249–257.

- Potter MA, De Jong KA (2000) Cooperative coevolution: An architecture for evolving coadapted subcomponents. *Evolutionary Computation* 8(1):1–29.
- Potvin JY, Bengio S (1996) The vehicle routing problem with time windows—part II: Genetic search. *INFORMS Journal on Computing* 8(2):165–172.
- Potvin JY, Kervahut T, Garcia B, Rousseau JM (1993) A Tabu search for the vehicle routing problem with time window. Technical Report CRT-855, Centre de Recherche sur les Transports, University de Montreal, Canada.
- Potvin JY, Kervahut T, Garcia B, Rousseau JM (1996) The vehicle routing problem with time windows—part I: Tabu search. *INFORMS Journal on Computing* 8(2):158–164.
- Pulido GT, Coello Coello CA (2003) The micro genetic algorithm 2: Towards online adaptation in evolutionary multiobjective optimization. In: *Evolutionary Multi-Criterion Optimization: The Second International Conference (EMO2003)*. Springer, pp 252–266.
- Rego C (2001) Node ejection chains for the vehicle routing problem: Sequential and parallel algorithms. *Parallel Computing* 27(3):201–222.
- Rekiek B, Lit PD, Pellichero F, L'Eglise T, Falkenauer E, Delchambre A (2000) Dealing with user's preferences in hybrid assembly lines design. In: *Proceedings of the MCPI'2000 Conference*.
- Richardson JT, Palmer MR, Liepins G, Hilliard M (1989) Some guidelines for genetic algorithms with penalty functions. In: Schaffer JD (ed) *Proceedings of the 3rd International Conference on Genetic Algorithms*. Morgan Kaufmann, San Mateo, CA, pp 191–197.
- Ritzel BJ, Eheart JW, Ranjithan S (1994) Using genetic algorithms to solve a multi objective groundwater pollution containment problem. *Water Resources Research* 30:1589–1603.
- Rivera W (2001) Scalable parallel genetic algorithms. *Artificial Intelligence Review* 16:153–168.
- Rochat Y, Taillard ED (1995) Probabilistic diversification and intensification in local search for vehicle routing problem. *Journal of Heuristics* 1(1):147–167.
- Romero CEM, Manzanares EM (1999) MOAQ and Ant-Q algorithm for multiple objective optimization problems. In: Banzhaf W, Daida J, Eiben AE, Garzon MH, Honavar V, Jakiela M, Smith RE (eds) *Genetic and Evolutionary Computing Conference (GECCO 99)*. Morgan Kaufmann, San Francisco, vol 1, pp 894–901.
- Rosin CD, Belew RK (1997) New methods for competitive coevolution. *Evolutionary Computation* 5(1):1–29.
- Rousseau LM, Gendreau M, Pesant G (2002) Using constraint-based operators to solve the vehicle routing with time windows. *Journal of Heuristics* 8(1):43–58.
- Sait SM, Youssef H, Ali H (1999) Fuzzy simulated evolution algorithm or multiobjective optimization of VLSI placement. In: *Proceedings of the 1999 Congress on Evolutionary Computation*, vol 1, pp 91–97.
- Sakawa M, Yauchi K (2001) An interactive fuzzy satisficing method for multiobjective nonconvex programming problems with fuzzy numbers through coevolutionary genetic algorithms. *IEEE Transactions on Systems, Man and Cybernetics, Part B* 31(3):459–467.
- Sakawa M, Kato K, Shibano T (1996) An interactive fuzzy satisfying method for multiobjective multidimensional 0-1 knapsack problems through genetic algorithms. In: *Proceedings of the 1996 Congress on Evolutionary Computation*, pp 243–246.

- Sandgren E (1994) Multicriteria design optimization by goal programming. In: Adeli H (ed) *Advances in Design Optimization*. Chapman & Hall, London, pp 225–265.
- Savelsbergh MWP (1985) Local search for routing problems with time windows. *Annals of Operations Research* 4:285–305.
- Sbalzarini IF, Müller S, Koumoutsakos P (2001) Microchannel optimization using multiobjective evolution strategies. In: *First International Conference on Evolutionary Multi-Criterion Optimization*. Springer-Verlag, NY, pp 516–530.
- Schaffer JD (1985). Multiple objective optimization with vector evaluated genetic algorithms. In: *Proceedings of the First International Conference on Genetic Algorithms: Genetic Algorithms and their Applications*. Lawrence Erlbaum, pp 93–100.
- Schaffer JD, Caruana RA, Eshelman LJ, Das R (1989) A study of control parameters affecting online performance of genetic algorithms for function optimization. In: *Proceedings of the 3rd International Conference on Genetic Algorithms*, pp 51–60.
- Schroder P, Chipperfield AJ, Fleming PJ, Grum N (1997) Multiobjective optimization of distributed active magnetic bearing controllers. In: *Conference on Genetic Algorithms in Engineering Systems: Innovations and Applications*, pp 13–18.
- Schulze J, Fahle T (1999) A parallel algorithm for the vehicle routing problem with time window constraints. *Annals of Operations Research* 86:585–607.
- Schütze O, Mostaghim S, Dellnitz M, Teich J (2003) Covering Pareto sets by multilevel evolutionary subdivision techniques. In: *Evolutionary Multicriterion Optimization: The Second International Conference (EMO2003)*, *Lecture Notes in Computer Science* 2632. Springer-Verlag, pp 118–132.
- Sefrioui M, Periaux J (2000) Nash genetic algorithms: Examples and applications. In: *Proceedings of the 2000 Congress on Evolutionary Computation*, vol 1, pp 509–516.
- Shaw P (1998) Using constraint programming and local search methods to solve vehicle routing problems. In: Maher M, Puget JF (eds) *Principles and Practice of Constraint Programming—CP98*, *Lecture Notes in Computer Science*. Springer-Verlag, NY, pp 417–431.
- Shaw KJ, Notcliffe AL, Thompson M, Love J, Fonseca CM, Fleming PJ (1999) Assessing the performance of multiobjective genetic algorithms for optimization of batch process scheduling problem. In: *Proceedings of the 1999 Congress on Evolutionary Computation*, vol 1, pp 37–45.
- Silva VVR, Fleming PJ (1998) Multiobjective nonlinear robust control design for gas turbine engines using evolutionary computing. In: *Proceedings of Mathematical Theory Networks Systems Conference*, pp 1087–1090.
- Skogestad S, Postlethwaite I (1996) *Multivariable Feedback Control: Analysis and Design*. John Wiley & Sons Ltd, West Sussex, England.
- Skogestad S, Morari M, Doyle J (1989) Robust control of ill-conditioned plants: High-purity distillation. *IEEE Transactions on Automatic Control* 33(12):672–681.
- Smith RE (1993) Adaptively resizing populations: An algorithm and analysis. In: Forrest S (ed) *Proceedings of the Fifth International Conference on Genetic Algorithms*. Morgan Kaufmann Publishers, Los Altos, CA, p 653.
- Snell SA, Hess RA (1997) Robust, decoupled, flight control design with rate saturating actuators. In: *Conference and Exhibition on AIAA Atmospheric Flight Mechanics*, pp 733–745.

- Socha K, Kisiel-Dorohinicki M (2002) Agent-based evolutionary multiobjective optimization. In: Proceedings of the 2002 Congress on Evolutionary Computation, vol 1, pp 109–114.
- Solich R (1969) Zadanie Programowania Liniowego Z Wieloma Funkcjami Celu (Linear Programming Problem with Several Objective Functions). *Przegląd Statystyczny* 16 (in Polish), pp 24–30.
- Solomon MM (1987) Algorithms for vehicle routing and scheduling problem with time window constraints. *Operations Research* 35(2):254–265.
- Srinivas N, Deb K (1994) Multiobjective optimization using nondominated sorting in genetic algorithms. *Journal of Evolutionary Computation* 2(3):221–248.
- Steuer J (1986) *Multicriteria Optimization: Theory, Computation, and Application*. John Wiley, NY.
- Stoorvogel A (1992) *Control Problem: A State-Space Approach*. Prentice-Hall, Englewood Cliffs, NJ.
- Tagami T, Kawabe T (1999) Genetic algorithm based on a Pareto neighbor search for multiobjective optimization. In: Proceedings of the 1999 International Symposium of Nonlinear Theory and Its Applications (NOLTA'99), pp 331–334.
- Taillard E, Badeau P, Gendreau M, Guertin F, Potvin JY (1997) A tabu search heuristic for the vehicle routing problem with soft time windows. *Transportation Science* 31(2):170–186.
- Tan KC, Li Y (1997) Multiobjective genetic algorithm based time and frequency domain design unification of control systems. In: IFAC International Symposium on Artificial Intelligence in Real-Time Control, pp 61–66.
- Tan KC, Li Y (2000) Evolutionary L -inf identification and model reduction for robust control. *Proc. I. Mech. E., Part I*, 214:231–237.
- Tan, KC, Lee TH, Khor EF (1999a) Control system design automation with robust tracking thumbprint performance using a multiobjective evolutionary algorithm. In: IEEE International Conference on Control Applications and System Design, pp 498–503.
- Tan, KC, Lee TH, Khor EF (1999b) Evolutionary algorithms with goal and priority information for multiobjective optimization. In: Proceedings of the 1999 Congress on Evolutionary Computation, vol 1, pp 106–113.
- Tan, KC, Khor EF, Lee TH (2001a) Exploratory multiobjective evolutionary algorithm: Performance study and comparisons. In: Genetic and Evolutionary Computation Conference, San Francisco, CA, pp 647–654.
- Tan, KC, Lee TH, Khor EF (2001b) Automating design of multivariable QFT control system via evolutionary computation. *Proc. I. Mech. E., Part I*, 215:245–259.
- Tan, KC, Lee TH, Khor EF (2001c) Evolutionary algorithm with dynamic population size and local exploration for multiobjective optimization. *IEEE Transactions on Evolutionary Computation* 5(6):565–588.
- Tan, KC, Lee TH, Khor EF (2001d) Incrementing multiobjective evolutionary algorithms: Performance studies and comparisons. In: International Conference on Evolutionary Multicriteria Optimization (EMO'01), pp 111–125.
- Tan, KC, Lee TH, Khoo D, Khor EF (2001e) A multiobjective evolutionary algorithm toolbox for computer-aided multiobjective optimization. *IEEE Transactions on System, Man and Cybernetics Part B*, 31(4):537–556.
- Tan KC, Lee TH, Zhu QL, Ou K (2001f) Heuristic methods for vehicle routing problem with time windows. *Artificial Intelligence in Engineering* 15(3):281–295.

- Tan KC, Lee TH, Ou K (2001g) Hybrid genetic algorithms in solving vehicle routing problems with time window constraints. *Asia-Pacific Journal of Operational Research*, 18(1):121–130.
- Tan KC, Lee LH, Ou K (2001h) Artificial intelligence techniques in solving vehicle routing problems with time window constraints. *Engineering Applications of Artificial Intelligence* 14:825–837.
- Tan KC, Lee TH, Ou K, Lee LH (2001i) A messy genetic algorithm for the vehicle routing problem with time window constraints. In: *Proceedings of the 2001 Congress on Evolutionary Computation*, pp 679–686.
- Tan KC, Lee TH, Khor EF (2002a) Evolutionary algorithms for multiobjective optimization: Performance assessments and comparisons. *Artificial Intelligence Review* 17(4):251–290.
- Tan KC, Khor EF, Cai J, Heng CM, Lee TH (2002b) Automating the drug scheduling of cancer chemotherapy via evolutionary computation. *Artificial Intelligence in Medicine* 25:169–185.
- Tan KC, Tay A, Cai J (2003a) Design and implementation of a distributed evolutionary computing software. *IEEE Transactions on Systems, Man and Cybernetics—Part C* 33(3):325–338.
- Tan KC, Khor EF, Lee TH, Sathikannan R (2003b) An evolutionary algorithm with advanced goal and priority specification for multiobjective optimization. *Journal of Artificial Intelligence Research* 18:183–215.
- Tavares J, Pereira FB, Machado P, Costa E (2003) On the influence of GVR in vehicle routing. In: *ACM Symposium on Applied Computing (SAC 2003)*. Florida.
- Thangiah SR, Osman IH, Sun T (1994) Hybrid genetic algorithm, simulated annealing and Tabu search methods for vehicle routing problems with time windows. Technical Report SRU CpSc-TR-94-27, Computer Science Department, Slippery Rock University.
- Thangiah SR (1995) An adaptive clustering method using a geometric shape for vehicle routing problems with time windows. In: *The Sixth International Conference on Genetics Algorithm*, vol 1, pp 452–459.
- The Math Works, Inc. (1998) *Using MATLAB*, version 5.
- The Math Works, Inc. (1999) *Simulink: User's Guide*, version 3.
- Thierens D, Bosman PAN (2001) Multiobjective mixture-based iterated density estimation evolutionary algorithms. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO'2001)*. Morgan Kaufmann Publishers, San Mateo, CA, pp 663–670.
- Thompson DF, Nwokah ODI (1994) Analytical loop-shaping methods in quantitative feedback theory. *Journal of Dynamic Systems, Measurement and Control* 116:169–177.
- Thompson HA, Fleming PJ (1999) An integrated multidisciplinary optimisation environment for distributed aero-engine control system architectures. In: *Proceedings 14th World Congress of International Federation of Automatic Control*, pp 407–412.
- Toth P, Vigo D (2002) *The Vehicle Routing Problem*. SIAM, Philadelphia.
- Valenzuela-Rendón M, Uresti-Charre E (1997) A non-generational genetic algorithm for multiobjective optimization. In: *Proceedings of the Seventh International Conference on Genetic Algorithms*. Morgan Kauffmann, San Francisco, CA, pp 658–665.

- Van Veldhuizen DA, Lamont GB (1998a) Evolutionary computation and convergence to a Pareto front. In: Koza JR (ed) *Late Breaking Papers at the Genetic Programming 1998 Conference*. Stanford University Bookstore, CA, pp 221–228.
- Van Veldhuizen DA, Lamont GB (1998b) Multiobjective evolutionary algorithm research: A history and analysis. Technical Report TR-98-03, Department of Electrical and Computer Engineering, Air Force Institute of Technology, Ohio.
- Van Veldhuizen DA, Lamont GB (1999) Multiobjective evolutionary algorithm test suites. In: *Symposium on Applied Computing*, San Antonio, TX, pp 351–357.
- Van Veldhuizen DA, Lamont GB (2000) Multiobjective evolutionary algorithms: Analyzing the state-of-the-art. *Journal of Evolutionary Computation* 8(2):125–147.
- Vavak F, Jukes K, Fogarty TC (1997) Learning the local search range for genetic optimization in nonstationary environments. In: *Proceedings of the 1997 Congress on Evolutionary Computation*, pp 355–360.
- Vemuri VR, Cedeino W (1995) A new genetic algorithm for multiobjective optimization in water resource management. In: *Proceedings of the 1995 Congress on Evolutionary Computation*, vol 1, pp 495–500.
- Venkat R, Mandava J, Fitzpatrick M, Pickens DR (1989) Adaptive search space scaling in digital image registration. *IEEE Transactions on Medical Imaging* 8(3):251–262.
- Viennet R, Fonteix C, Marc I (1996) Multicriteria optimization using a genetic algorithm for determining a Pareto set. *International Journal of Systems Science* 27(2):255–260.
- Voget S, Kolonko M (1998) Multidimensional optimization with a fuzzy genetic algorithm. *Journal of Heuristics* 4(3):221–244.
- Weerasooriya S, Phan DT (1995) Discrete time LQG/LTR design and modeling of a disk drive actuator tracking servo system. *IEEE Trans. on Ind. Elecs.* 42(3):240–247.
- Weerasooriya S (1996) *The Basic Servo Problem* Technical Report. Data Storage Institute, National University of Singapore, Singapore.
- Whitley D, Starkweather T, Fuquay D (1989) Scheduling problems and traveling salesmen: The genetic edge recombination operator. In: *Third International Conference on Genetic Algorithms*. Morgan Kaufmann, San Mateo, CA, pp 133–140.
- Wilson PB, Macleod MD (1993) Low implementation cost IIR digital filter design using genetic algorithms. In: *IEE/IEEE Workshop on Natural Algorithms in Signal Processing*. Chelmsford, UK, pp 4/1–4/8.
- Wolpert D, Macready G (1996) No free lunch theorems for optimization. *IEEE Transactions on Evolutionary Computation* 1(1):67–82.
- Yaniv O, Schwartz B (1990) A criterion for loop stability in the horowitz synthesis of MIMO feedback systems. *International Journal of Control* 53(3):527–539.
- Yaniv O, Horowitz I (1986) A quantitative design method for MIMO linear feedback system having uncertain plants. *International Journal of Control* 43(2):401–421.
- Yellow P (1970) A computational modification to the saving method of vehicle scheduling. *Operational Research Quart.* 21(2):281–283.
- Yen JY, Hallamasek K, Horowitz R (1990) Track-following controller designs of a compound disk drive actuator. *J. Dyn. Syst. Meas. and Contr.* 112:391–402.
- Yokose Y, Cingoski V, Kaneda K, Yamashita H (1999) Shape optimization of magnetic devices using genetic algorithms with dynamically adjustable parameters. *IEEE Transactions on Magnetics* 35(3):1686–1689.
- Zames G (1966) On the input–output stability of time-varying non-linear feedback systems, parts I and II. *IEEE Transactions on Automatic Control*, AC-11, 2 & 3, pp. 228–238 & 465–476.

-
- Zbigniew CJ, Piotr C (2001) Parallel simulated annealing for the vehicle routing problem with time windows. Technical report, Silesia University of Technology.
- Zhao C, Brizuela A, Sannomiya N (2001) Application of the partial enumeration selection method in genetic algorithms to solving a multiobjective flowshop problem. In: IEEE International Conference on Systems, Man, and Cybernetics, vol 4, pp 2365–2370.
- Zhou T, Kimura H (1991) Controller design of ill-conditioned plant using robust stability degree assignment. In: Proceedings of the 30th Conference on Decision and Control, pp 1591–1595.
- Zhuang N, Benten MS, Cheung PY (1996) Improved variable ordering of BDDS with novel genetic algorithm. In: IEEE International Symposium on Circuits and Systems, vol 3, pp 414–417.
- Zitzler E, Thiele L (1999) Multiobjective evolutionary algorithms: A comparative case study and the strength Pareto approach. *IEEE Transactions on Evolutionary Computation* 3(4):257–271.
- Zitzler E, Deb K, Thiele L (2000) Comparison of multiobjective evolutionary algorithms: Empirical results. *Evolutionary Computation* 8(2):173–195.
- Zitzler E, Laumanns M, Thiele L (2001) SPEA2: Improving the strength Pareto evolutionary algorithm. Technical Report 103, Computer Engineering and Networks Laboratory (TIK), Swiss Federal Institute of Technology (ETH), Zurich, Switzerland.

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