Publications

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Journal papers

Westerlund T., Eronen V.-P. and Mäkelä M.M. (2022). Using Projected Cutting Planes in the Extended Cutting Plane Method. *Optimization*, **71**, 4147-4176. (Open Access, June-15-2021, Taylor & Francis), https://doi.org/10.1080/02331934.2021.1939337.

Lundell A., Kronqvist J. and Westerlund T. (2022). The supporting hyperplane optimization toolkit for convex MINLP. *Journal of Global Optimization*. **84**, 1-41. (Published On-line, February 10, 2022). Springer. https://doi.org/10.1007/s10898-022-01128-0.

Kronqvist J., Bernal D. E., Lundell A. and Westerlund T. (2019). A center-cut algorithm for quickly obtaining feasible solutions and solving convex MINLP problems. *Computers and Chemical Engineering*, **122**, 105-113. (Published On-line, June 27, 2018). https://doi.org/10.1016/j.compchemeng.2018.06.019, Elsevier Ltd.

Westerlund T., Eronen V.-P., and Mäkelä M. M. (2018). On solving generalized convex MINLP problems by supporting hyperplane techniques. *Journal of Global Optimization*, **71**, 987-1011. (Published On-line, March 26, 2018). https://doi.org/10.1007/s10898-018-0644-z, Springer.

Kronqvist J., Lundell A. and Westerlund T. (2018). Reformulations for utilizing separability when solving convex MINLP problems. *Journal of Global Optimization*, **71**, 571-592. (Published On-line, February 9, 2018). https://doi.org/10.1007/s10898-018-0616-3, Springer.

Lundell A. and Westerlund T. (2018). Solving global optimization problems using reformulations and signomial transformations. *Computers and Chemical Engineering*, **116**, 122-134. (Published on-line, Nov 6, 2017). https://doi.org/10.1016/j.compchemeng.2017.10.035, Elsevier Ltd.

Pörn, R., Nissfolk O. Skjäl A., and Westerlund T. (2017). Solving 0-1 quadratic programs by reformulation techniques. *Industrial and Engineering Chemistry Research*, **56**, 13444-13453. (Published online ACS-ASAP: June 12, 2017). DOI: 10.1021/acs.iecr.7b01270, Elsevier.

Russo V., Salmi S., Carletti C., Murzin D., Westerlund T. Tesser R. and Grenman H. (2017). Application of an extended shrinking film model to limestone dissolution. *Industrial and Engineering Chemistry Research*, **56**, 13254-13261. (Published online ACS-ASAP: June 27, 2017). DOI: 10.1021/acs.iecr.7b01654, Elsevier.

Eronen V.-P., Kronqvist J., Westerlund T., Mäkelä M. M. and Karmitsa N. (2017). Method for solving generalized convex nonsmooth mixed-integer nonlinear programming problems. *Journal of Global Optimization*, **69**, 443-459. (Published online: May 5, 2017). DOI 10.1007/s10898-017-0528-7.

Carletti C., De Blasio C., Miceli M., Pirone R. and Westerlund T. (2017). Ultrasonic enchanced limestone dissolution: Experimental and mathematical modeling. *Chemical Engineering and Processing: Process Intensification*, **118**, 26-36. Elsevier.

Salmi T., Russo V., Carletti C., Kilpiö T., Tesser R., Murzin D., Westerlund T. and Grenman H. (2017). Application of film theory on the reactions of solid particles with liquids: Shrinking particles with changing liquid films, *Chemical Engineering Science*, **160**, 161-170.

Kronqvist J., Lundell A. and Westerlund T.(2016). The extended supporting hyperplane algorithm for convex mixed-integer nonlinear programming. *Journal of Global Optimization*, **64**, 249-272. Available on-line, June 25th 2015, Springer. 10.1007/s10898-015-0322-3

De Blasio, C., Carletti C., Lundell A., Visuri V.-V., Kokkonen T., Westerlund T., Fabritius T. and Järvinen M. (2016). Employing a step-wise titration method under semi-slow reaction regime for evaluating the reactivity of limestone and dolomite in acidic environment. *Minerals Engineering*, **86**, 43-58.

Carletti C., Grenman H., De Blasio C., Mäkilä E., Salonen J., Murzin D., Salmi T. and Westerlund T. (2016). Revisiting the dissolution kinetics of limestone - experimental analysis and modeling. *Journal of Chemical Technology and Biotechnology*, **91**, 1517-1531. Wiley. Available on-line, June 9th 2015, Wiley On Line Library. DOI 10.1002/jctb.4750

De Blasio C., Lucca G., Özdenkci K., Mulas M., Lundqvist K., Koskinen J., Santarelli M., Westerlund T. and Järvinen M. (2016). A study on supercritical water gasification of sucrose and black liquor conducted in stainless steel and nickel-chromium-molybdenum reactors. *Journal of Chemical Technology and Biotechnology*, **91**, 2664-2678.

Carletti C., De Blasio, C., Mäkilä E., Salonen J. and Westerlund T. (2015). Optimization of a wet flue gas desulfurization scrubber through mathematical modeling of limestone dissolution experiments. *Industrial Engineering Chemistry Research*, **54**, 9783-9797. ACS, article ASAP, Publication Date (Web): September 18, 2015, DOI: 10.1021/acs.iecr.5b02691

Eronen V.-P., Mäkelä M. M. and Westerlund T. (2015). Extended cutting plane method for a class of nonsmooth nonconvex MINLP problems, *Optimization*, **64**, 641-661. Available on-line, June 6th 2013, DOI:10.1080/02331934.2013.796473, Taylor and Francis.

Skjäl A. and Westerlund T. (2014). New Methods for Calculating αBB-type Underestimators. *Journal of Global Optimization*, **58**, 411-427. Available on-line, April 2nd 2013, Springer.

Carletti C., Montane G., Westerlund T. and Paglianti A. (2014). Analysis of solid concentration distribution in dense solid/liquid stirred tanks by Electrical Resistance Tomography. *Chemical Engineering Science*, **119**, 53-64.

Eronen V.-P., Mäkelä M. M. and Westerlund T. (2014). On the generalization of ECP and OA methods to nonsmooth convex MINLP problems, *Optimization*, **63**, 1057-1073. Available on-line, August 7th 2012, Taylor and Francis.

De Blasio C., Carletti C., Westerlund T. and Järvinen M. (2013). On modeling the dissolution of sedimentary rocks in acidic environments. An overview of selected mathematical methods with demonstration of a case study. *Journal of Mathematical Chemistry*, **51**, 2120-2143. Available on-line, June 9th 2013, DOI 10.1007/s10910-013-0202-3, Springer.

Nyberg A., Grossmann I. E. and Westerlund T. (2013). An Efficient Reformulation of the Multiechelon Stochastic Inventory System with Uncertain Demands. *AIChE Journal*, **59**, 23-28. Available on-line November 29th 2012, DOI 10.1002/aic.13977.

Carletti C., Bjondahl F., De Blasio C., Ahlbeck J., Järvinen L. and Westerlund T. (2013). Modeling Limestone Reactivity and Sizing the Dissolution Thank in Wet Flue Gas Desulfurization Scrubbers. *Environmental Progress and Sustainable Energy*, **32**, 663-672. Available Wiley Online Library, August 3th 2012, DOI 10.1002/ep.11683, Wiley.

Lundell A., Skjäl A. and Westerlund T. (2013). A Reformulation Framework for Global Optimization. *Journal of Global Optimization*, **57**, 115-141. Available on-line, February 24th 2012, DOI:10.1007/s10898-012-9877-4, Springer.

Skjäl A., Westerlund T., Misener R. and Floudas C. A. (2012). A Generalization of the Classical αBB Convex Underestimation via Diagonal and Non-diagonal Quadratic Terms. *Journal of Optimization Theory and Applications*, **154**, 462-490. Available on-line, March 30th, 2012, DOI: 10.1007/s10957-012-0033-6, Springer.

Nyberg A. and Westerlund T. (2012). A New Exact Discrete Linear Reformulation of the Quadratic Assignment Problem. *European Journal of Operational Research*, **220**, 314-319. Available on-line, February 16th 2012.

De Blasio C., Mäkilä E. and Westerlund T. (2012). Use of Carbonate Rocks for Flue Gas Desulfurization: Reactive Dissolution of Limestone Particles. *Applied Energy*, **90**, 175-181. Available on-line, December 8th 2010.

Karelahti J., Vainiomäki P. and Westerlund T. (2011). Large Scale Production Planning in the Stainless Steel Industry. *Industrial and Engineering Chemistry Research*, **50**, 4893-4906.

Rönnlund I., Myréen L., Lundqvist K., Ahlbeck J. and Westerlund T. (2011). Waste to energy by industrial integrated supercritical water gasification - Effects of alkali salts in residual byproducts from the pulp and paper industry. *Energy*, **36**, 2151-2163. Available on-line, April 24th 2010.

Still C. and Westerlund T. (2010). A Linear Programming-Based Optimization Algorithm for Solving Nonlinear Programming Problems. *European Journal of Operational Research*, **200**, 658-670. Available on-line January 31st 2009.

Lundell A. and Westerlund T. (2009). Convex Underestimation Strategies for Signomial Functions. *Optimization Methods and Software*, **24**, 505-522. Available on-line March 30th 2009.

Lastusilta T., Bussieck M. and Westerlund T. (2009). An Experimental Study of GAMS/AlphaECP MINLP Solver. *Industrial and Engineering Chemistry Research*, **48**, 7337-7345.

Lundell A., Westerlund J. and Westerlund T. (2009). Some Transformation Techniques with Applications in Global Optimization. *Journal of Global Optimization*, **43**, 391-405.

Emet S. and Westerlund T. (2008). Solving a Dynamic Separation Problem using MINLP Techniques. *Applied Numerical Mathematics*, **58**, 395-406.

Pörn R., Björk K-M. and Westerlund T. (2008). Global Solution of Optimization Problems with Signomial Parts. *Discrete Optimization*, **5**, 108-120.

Westerlund J., Papageorgiou L. G. and Westerlund T. (2007). A MILP Model for *N*-Dimensional Allocation. *Computers and Chemical Engineering*, **31**, 1702-1714.

Westerlund J., Hästbacka M., Forssell S. and Westerlund T. (2007). A Mixed-Time MILP Scheduling Model. *Industrial and Engineering Chemistry Ressearch*, **46**, 2781-2796.

Still C. and Westerlund T. (2006). Solving Convex MINLP Optimization Problems Using a Sequential Cutting Plane Algorithm. *Computational Optimization and Applications*, **34**, 63-83.

Still C. and Westerlund T. (2006). A Sequential Cutting Plane Algorithm for Solving Convex NLP Problems. *European Journal of Operational Research*, **173**, 444-469.

Castillo I., Westerlund J., Emet S. and Westerlund T. (2005). Optimization of Block Layout Design Problems with Unequal Areas: A Comparison of MILP and MINLP Optimization Methods, *Computers and Chemical Engineering*, **30**, 54-69.

Castillo I. and Westerlund T. (2005). An ϵ-Accurate Model for Optimal Unequal-Area Facility Layout. *Computers and Operations Research*, **32**, 429-447.

Emet S. and Westerlund T. (2004). Comparisons of Solving a Chromatographic Separation Problem Using MINLP Methods. *Computers and Chemical Engineering*, **28**, 673-682.

Björk K-M., Lindberg P.O., and Westerlund T. (2003). Some Convexfications in Global Optimization of Problems Containing Signomial Terms. *Computers and Chemical Engineering*, **27**, 669-679.

Björk K.-M. and Westerlund T. (2002). Global Optimization of Heat Exchanger Network Synhesis Problems With and Without the Isothermal Mixing Assumption. *Computers and Chemical Engineering*, **26**, 1581-1593.

Westerlund T. and Pörn R. (2002). Solving Pseudo-Convex Mixed Integer Optimization Problems by Cutting Plane Techniques. *Optimization and Engineering*, **3**, 253-280.

Roslöf J., Harjunkoski I., Westerlund T. and Isaksson J. (2002). Solving a Large-Scale Industrial Scheduling Problem Using MILP Combined with a Heuristic Procedure. *European Journal of Operational Research*, **138**, 29-42.

Björkqvist J. and Westerlund T. (2001). Parallel Solution of Disjunctive MINLP Problems. *Chemical Engineering Communications*, **185**, 115-124.

Roslöf J., Harjunkoski I., Björkqvist J., Karlsson S. and Westerlund T. (2001). An MILP-Based Reordering Algorithm for Complex Industrial Scheduling and Rescheduling. *Computers and Chemical Engineering*, **25**, 821-828.

Pörn R. and Westerlund T. (2000). A Cutting Plane Method for Minimizing Pseudo-Convex Functions in the Mixed Integer Case. *Computers and Chemical Engineering*, **24**, 2655-2665.

Östermark R., Skrifvars H. and Westerlund T. (2000) A Non-linear Mixed Integer Multiperiod Firm Model. *International Journal of Production Economics*, **67**, 183-199.

Harjunkoski I., Westerlund T. and Pörn R. (1999). Numerical and Environmental Considerations on a Complex Industrial MINLP Problem. *Computers and Chemical Engineering*, **23**, 1545-1561.

Harjunkoski I., Pörn R. and Westerlund T. (1999). Exploring the Convex Transformations for Solving Non-Convex Bilinear Integer Problems. *Computers and Chemical Engineering*, **23**, Suppl., 471-474.

Roslöf J, Harjunkoski I., Westerlund T. and Isaksson J. (1999). A Short-Term Scheduling Problem in the Paper-Converting Industry. *Computers and Chemical Engineering*, **23**, Suppl., 871-874.

Björkqvist J. and Westerlund T. (1999). Automated Reformulation of Disjunctive Constraints in MINLP Optimization. *Computers and Chemical Engineering*, **23**, Suppl., 11-14.

Karlsson S., Pettersson F. and Westerlund T. (1999). A MILP-method for Optimizing a Preparative Simulated Moving Bed Chromatographic Separation Process. *Computers and Chemical Engineering*, **23**, Suppl., 487-490.

Pörn R., Harjunkoski I. and Westerlund T. (1999). Convexification of Different Classes of Non-Convex MINLP Problems. *Computers and Chemical Engineering*, **23**, 439-448.

Skrifvars H., Leyffer S. and Westerlund T. (1998). Comparison of Certain MINLP Algorithms when Applied to a Model Structure Determination and Parameter Estimation Problem. *Computers and Chemical Engineering*, **22**, 1829-1835.

Westerlund T. and Isaksson J. (1998). Some Efficient Formulations for the Simultaneous Solution of Trim-Loss and Scheduling Problems in the Paper-Converting Industry. *Chemical Engineering Research and Design*, **76**, 677-684.

Harjunkoski I. and Westerlund T. (1998). Enlarging the Trim-Loss Problem to Cover the Raw Paper Mill. *Computers and Chemical Engineering*, **22**, Suppl., 1019-1022.

Westerlund T., Isaksson J. and Harjunkoski I. (1998). Solving a Two-Dimensional Trim Loss Problem with MILP. *European Journal of Operational Research*, **104**, 572-581.

Harjunkoski I., Pörn R., Westerlund T. and Skrifvars H. (1998). Different Transformations for Solving Non-Convex Trim Loss Problems with MINLP. *European Journal of Operational Research*, **105**, 594-603.

Westerlund T., Skrifvars H., Harjunkoski I. and Pörn R. (1998). An Extended Cutting Plane Method for A Class of Non-Convex MINLP Problems. *Computers and Chemical Engineering*, **22**, 357-365.

Westerlund T., Harjunkoski I. and Isaksson J. (1998). Solving a Production Optimization Problem in a Paper Converting Mill with MILP. *Computers and Chemical Engineering*, **22**, 563-570.

Harjunkoski I., Pörn R., Westerlund T. and Skrifvars H. (1997). Different Strategies for Solving Bilinear Integer Non-Linear Programming Problems by Convex Transformations. *Computers and Chemical Engineering*, **21**, Suppl., 487-492.

Pettersson F. and Westerlund T. (1996). Global Optimization of Pump Configurations using Binary Separable Programming. *Computers and Chemical Engineering*, **21**, 521-529.

Harjunkoski I., Westerlund T., Isaksson J. and Skrifvars H. (1996). Different Formulations for Solving Trim Loss Problems in a Paper Converting Mill with ILP. *Computers and Chemical Engineering*, **20**, Suppl., 121-126.

Skrifvars H., Harjunkoski I., Westerlund T., Kravanja Z. and Pörn R. (1996). Comparison of Different MINLP Methods Applied on Some Chemical Engineering Problems. *Computers and Chemical Engineering*, **20**, Suppl., 333-338.

Brink A. and Westerlund T. (1995). The Joint Problem of Model Structure Determination and Parameter Estimation in Quantitative IR-Spectroscopy. *Chemometrics and Intelligent Laboratory Systems*, **29**, 29-36.

Westerlund T. and Pettersson F. (1995). An Extended Cutting Plane Method for Solving Convex MINLP Problems. *Computers and Chemical Engineering*, **19**, Suppl., 131-136.

Westerlund T., Pettersson F. and Grossmann I. E. (1995). Optimization of Pump Configurations as a Mixed-Integer-Nonlinear- Programming Problem. *Computers and Chemical Engineering*, **18**, 845-858.

Fellman J., Westerlund T. (1992). Determination of the Complex Indices of Refraction of Glasses Using Kramers-Krönig Transformation. *Journal of Non-Crystalline Solids*, **146**, 165-174.

Karrila S. and Westerlund T. (1991). An Elementary Derivation of the Maximum Likelihood Estimator of the Covariance Matrix, and an Illustrative Determinant Inequality. *Automatica*, **27**, 425-426.

Westerlund T. and Salmi T. (1990). Factorization of Reaction Systems Applied to Catalytic Reactions. *Chemical Engineering Science*, **45**, 237-241.

Westerlund T. and Hoikka T. (1989). On the Modeling of Mineral Fiber Formation. *Computers and Chemical Engineering*, **13**, 1153-1163.

Westerlund T. and Saxén H. (1987). On the Uniqueness in Equilibrium Calculations. *Chemical Engineering Science*, **42**, 188-190.

Westerlund T. (1987). Reply to Dr. Guinons comment., *Chemical Engineering Science*, **42**, 393-394.

Westerlund T. and Saxén H. (1987). Authorś Reply to Comments by R. A. Heidemann, *Chemical Engineering Science*, **42**, 2798-2799.

Westerlund T., Skrifvars B. and Karrila S. (1985). On the Uniqueness in pH Calculations. *Chemical Engineering Science*, **40**, 973-976.

Westerlund T., Karrila S. and Perander K. (1985). A Shrinking Unreacted Core Model for Estimating the Compressive Strength of Portland Cement. *Cement and Concrete Research*, **15**, 959-963.

Westerlund T. (1985). Minimization of Production Costs in the Cement and Glass Industry. *Computers and Chemical Engineering*, **10**, 517-524.

Mäkilä P., Westerlund T. and Toivonen H. (1984). Constrained Linear Quadratic Gaussian Control with Process Applications. *Automatica*, **20**, 15-29.

Westerlund T., Hatakka L. and Karlsson K. H. (1983). A Model for Optimizing Glass Batch Compositions. *Journal of the American Ceramic Society*, **66**, 574-579.

Westerlund T. (1981). A Digital Quality Control System for an Industrial Dry Process Rotary Cement Kiln. *IEEE Transaction on Automatic Control*, **26**, 885-890.

Westerlund T., Toivonen H. and Nyman K.-E. (1980). Stochastic Modelling and Self Tuning Control of a Continuous Cement Raw Material Mixing System. *Modeling Identification and Control*, **1**, 17-37.

Westerlund T. and Tyssö A. (1980). Remarks on: Asymptotic Behavior of the Extended Kalman Filter as a Parameter Estimator for Linear Systems. *IEEE Transactions on Automatic Control*, **25**, 1011-1012.

Toivonen H. and Westerlund T. (1979). Reply by Toivonen and Westerlund. *Automatica*, **15**, 226.

Toivonen H. and Westerlund T. (1979). Comments on: Self Tuning Regulator applied to a Binary Distillation Column. *Automatica*, **15**, 223-224.

Books and book chapters

Eronen V.-E., Westerlund T. and Mäkelä M. M. (2020). *The Chapter:* On Mixed Integer Nonsmooth Optimization. pp. 549-578. In *Numerical Nonsmooth Optimization: State of the Art Algorithms*. Bagirov A.B., Gaudiosa M., Karmitsa N., Mäkelä M. M. and Taheri S. (eds.), *Springer*. First on-line: February 29, 2020. ISBN: 978-3-030-34909-7, doi: 10.1007/978-3-030-34910-3-16.

Lundell A. and Westerlund T. (2012). *The Chapter:* Global Optimization of Mixed-Integer Signomial programming problems. In *Mixed-Integer Nonlinear Optimization: Algorithmic advances and applications*, Jon Lee and Sven Leyffer (Editors). *Springer*, "Mixed Integer Nonlinear Programming". The IMA Volumes in Mathematics and its Applications, Vol. 154, Part 5, 349-369. 1st Edition., 2012, XVII, 690 p. 82 illus. Hardback, ISBN 978-1-4614-1926-6.

Still C. and Westerlund T. (2009). *The Chapter:* Sequential Cutting Plane Algorithm. In *Encyclopedia of Optimization 2009*, C.A. Floudas and P.M. Pardalos (eds.), *Springer*, Part 19, 3471-3476, ISBN 978-0-387-74758-3.

Still C. and Westerlund T. (2009). *The Chapter:* Extended Cutting Plane Algorithm. In *Encyclopedia of Optimization 2009*, C.A. Floudas and P.M. Pardalos (eds.), *Springer*, Part 5, 959-966, ISBN 978-0-387-74758-3.

Harjunkoski I., Pörn R. and Westerlund T. (2009). *The Chapter:* Mixed-Integer Non-Linear Programming: The Trim-Loss Problem. In *Encyclopedia of Optimization 2009*, C.A. Floudas and P.M. Pardalos (eds.), *Springer*, Part 13, 2190-2198, ISBN 978-0-387-74758-3.

Westerlund J., Hästbacka M., Kaplin J. and Westerlund T. (2008). *Chapter 8:* Production and Inventory Planning for Stock Preparation in the Tissue Industry. 237-268. In *Supply-Chain Optimization Volume 4: Part II*, L. Papageorgiou and M. Georgiadis (eds.), *Wiley-VCH Verlag*, ISBN 978-3-527-31906-0.

Westerlund T. (2006). *The Chapter :* Some Transformation Techniques in Global Optimization. In *Global Optimization, from Theory to Implementations*, L.Liberti and N. Maculan (eds.), *Springer*, 45-74. ISBN 0-387-28260-2.

Still C. and Westerlund T. (2001). *The Chapter:* Extended Cutting Plane Algorithm. In *Encyclopedia of Optimization*, C.A. Floudas and P.M. Pardalos (eds.), *Kluwer Academic Publishers*, Vol II, 53-61, ISBN 0-7923-6932-7.

Harjunkoski I., Pörn R. and Westerlund T. (2001). *The Chapter:* Mixed-Integer Non-Linear Programming: The Trim-Loss Problem. In *Encyclopedia of Optimization*, C.A. Floudas and P.M. Pardalos (eds.), *Kluwer Academic Publishers*, Vol III, 379-387, ISBN 0-7923-6932-7.

Westerlund T., Karrila S., Mäkilä P. M. and Brink A. (1996). The Chapter: Techniques in the Maximum Likelihood Estimation of the Covariance Matrix. In *Control and Dynamics Systems*, C. T. Leondes (editor), *ACADEMIC Press*, New York. 323-339.

Westerlund T. (Ed.) (1984). *Automation in Mining, Mineral and Metal Processing 1983. Pergamon Press*, New York, 754 p.

Conference papers

Kronqvist J., Lundell A. and Westerlund T. (2017). A center-cut algorithm for solving convex mixed-integer nonlinear programming problems. *Computer Aided Chemical Engineering*, **40**, 2131-2136, Elsevier. 2131-2136. http://dx.doi.org/10.1016/B978-0-444-63965-3.50357-3.

Lundell A., Kronqvist J. and Westerlund T. (2017). SHOT - A global solver for convex MINLP in Wolfram Mathematica. *Computer Aided Chemical Engineering*, **40**, 2137-2142, Elsevier. 2137-2142. http://dx.doi.org/10.1016/B978-0-444-63965-3.50358-5.

Lundell A., Kronqvist J. and Westerlund T. (2016). Improvements to the Supporting Hyperplane Optimization Toolkit Solver for Convex MINLP. *Proceedings of GOW'16*, Braga, Portugal, 101-104.

Kronqvist J., Lundell A. and Westerlund T. (2016). Lifted Polyhedral Approximations in Convex Mixed Integer Nonlinear Programming. *Proceedings of GOW'16*, Braga, Portugal, 117-120.

Nissfolk O., Pörn R. and Westerlund T. (2016). Testing the Non-Diagonal Quadratic Convex Reformulation Technique. *Computer Aided Chemical Engineering*, **38**, 331-336, Elsevier.

Carletti C., De Blasio C., Grenman H. and Westerlund T. (2015). On Modelling the Roles Played by Diffusive and Convective Transport in Limestone Dissolution for Wet Flue Gas Desulphurization. *Chemical Engineering Transactions*, **43**, 2131-2136.

Lundell A. and Westerlund T. (2015). Representation of the Convex Envelope of Bilinear Terms in a Reformulation Framework for Global Optimization. *Computer Aided Chemical Engineering*, **37**, 833-838, Elsevier.

Lundell A., Kronqvist J. and Westerlund T. (2014). An Extended Supporting Hyperplane Algorithm for Convex MINLP Problems. *Proceedings of MAGO 2014*, 21-24.

Skjäl A. and Westerlund T. (2013). A comparison of two convex underestimation methods for quadratic functions. *Computer Aided Chemical Engineering*, **32**, 535-540, Elsevier.

Lundell A. and Westerlund T. (2013). Refinement strategies for piecewise linear functions utilized by reformulation-based techniques for global optimization. *Computer Aided Chemical Engineering*, **32**, 529-534, Elsevier.

Nissfolk O. and Westerlund T. (2013). A Metaheuristic Optimization Algorithm for Binary Quadratic Problems. *Computer Aided Chemical Engineering*, **32**, 469-474, Elsevier.

Carletti C., Grenman H., De Blasio C. and Westerlund T. (2013). Limestone dissolution study for Wet Flue Gas Desulfurization under turbulent regimes above critical suspension speed *Computer Aided Chemical Engineering*, **32**, 301-306, Elsevier.

Lundell A. and Westerlund T. (2013). The Reformulation-based αGO Algorithm for Solving Nonconvex MINLP Problems - Some Improvements. *Chemical Engineering Transactions*, **32**, 1321-1326.

Nyberg A. and Westerlund T. (2013). Tightening a Discrete Formulation of the Quadratic Assignment Problem. *Chemical Engineering Transactions*, **32**, 1309-1314.

Nyberg A., Westerlund T. and Lundell A. (2013). Improved Discrete Reformulations for the Quadratic Assignment Problem. *Integration of AI and OR Techniques in Constraint Programming for Combinatorial Problems. Lecture Notes in Computer Science*, **7874**, 193-203.

Nissfolk O., Pörn R. and Westerlund T. (2012). A Mixed Integer Quadratic Reformulation of the Quadratic Assignment Problem with Rank-1 Matrix. *Proceedings of the 11th International Symposium on Process Systems Engineering, 360-364, 15-19 July Singapore.*

Lundell A. and Westerlund T. (2012). Finding an optimized set of transformations for convexifying nonconvex MINLP problems. *Proceedings of the 11th International Symposium on Process Systems Engineering, 15-19 July Singapore.*

De Blasio C., Carletti C., Lundqvist K., Saeed L., Westerlund T. and Fogelholm C-J. (2012). Modeling the dissolution of carbonate minerals utilized in Flue Gas Desulfurization scrubbers. A stepwise titration technique applied to low Grashof-Reynolds ratio. *Computer Aided Chemical Engineering*, **31**, 465-469, Elsevier.

Skjäl A., Misener R., Westerlund T. and Floudas C. A. (2012). A Generalization of Classical αBB Underestimation to Include Bilinear Terms. *Computer Aided Process Engineering*, , 1202-1206, Elsevier.

Westerlund T., Lundell A. and Westerlund J. (2011). Some Notes on Convex Relaxations in Nonconvex Optimization. *AIDIC Conference Series*, **10**, 383-392, ISBN-978-88-95608-58-7, ISSN 2036-5969, DOI: 10.3303/ACOS1110042.

Lastusilta T. and Westerlund T. (2011). A Comparative Study of Solving Quadratic Assignment Problems Using Some Standard MINLP Solvers. *SIMULTECH/2011*, 409-412.

Pörn R., Nissfolk O., Jansson F. and Westerlund T. (2011). The Coulomb Glass - Modeling and Computational Experience with a Large Scale 0-1 QP Problem. *Computer Aided Chemical Engineering*, **29**, 658-662, Elsevier

De Blasio C., Carletti C., Järvinen M. and Westerlund T. (2011). Evaluating the Reactivity of Limestone Utilized in Flue Gas Desulfurization. An Application of the Danckwerts Theory for Particles Reacting in Acidic Environments and Agitated Vessels with Archimedes Number Less than 40. *Computer Aided Chemical Engineering*, **29**, 1225-1229, Elsevier.

Myréen L., Rönnlund I. and Westerlund T. (2011). Integration of Supercritical Water Gasification (SCWG) in Pulp and Paper Production - A Feasibility Study of Integration Options. *Chemical Engineering Transactions*, **25**, 429-434.

Lastusilta T., Papageorgiou L. and Westerlund T. (2011). A Comparative Study of Solving the Problem of Module Identification in a Complex Network. *Chemical Engineering Transactions*, **24**, 319-324.

Skjäl A., Lundell A. and Westerlund T. (2011). Global Optimization with C^2 Constraints by Convex Reformulations. *Chemical Engineering Transactions*, **24**, 373-378.

Westerlund T., Lundell A. and Westerlund J. (2011). On Convex Relaxations in Nonconvex Optimization. *Chemical Engineering Transactions*, **24**, 331-334.

Westerlund T. and Lundell A. (2010). Global Optimization of Signomial Programming Problems. *Proceedings of the European Workshop on Mixed Integer Nonlinear Programming*, Marseille 12-16.4.2010, 89-92.

Myréen L., Rönnlund I., Lundqvist K., Ahlbeck J. and Westerlund T. (2010). Waste to energy by industrially integrated SCWG - Effect of process parameters on gasification of industrial biomass. *Chemical Engineering Transactions*, **19**, 7-12.

Westerlund T., Lundell A. and Westerlund J. (2009). On Convex Relaxations in Nonconvex Optimization. *ISMP 2009, Chicago 23-28.8.2009.*

Lundell A. and Westerlund T. (2009). Optimization of Transformations for Convex Relaxations of MINLP Problems Containing Signomial Functions. *10th International Symposium on Process Systems Engineering, PSE2009*, 231-236, Elsevier.

De Blasio C., Ahlbeck J. and Westerlund T. (2009). Modeling the Hydrodynamic and Mass-Transfer Phenomena for Sedimentary Rocks Used for Flue Gas Desulfurization. The Effect of Temperature. *10th International Symposium on Process Systems Engineering, PSE2009*, 411-416, Elsevier.

Lundell A. and Westerlund T. (2009). Implementation of a Convexification Technique for Signomial Functions. *Computer Aided Chemical Engineering*, **26**, 579-583, Elsevier.

Lastusilta T., Frankenhaeuser O., Pettersson F. and Westerlund T. (2009). An Optimization Tool for Solving a Large Scale Scheduling Problem. *Computer Aided Chemical Engineering*, **26**, 525-529, Elsevier.

De Blasio C., Mäkilä E. and Westerlund T. (2009). Simulating the change in shape factor for solid particles used in flue gas desulfurization and reacting in stirred batch systems. A mathematical model. *Computer Aided Chemical Engineering*, **26**, 821-826, Elsevier.

Lundell A. and Westerlund T. (2009). On the Relationship between Power and Exponential Transformations for Positive Signomial Functions. *Chemical Engineering Transactions*, **17**, 1287-1292.

De Blasio C. and Westerlund T. (2008). Use of sedimentary rocks and by-products from CO_2 fixation processes for flue gas desulfurization. Evaluating the rate of reaction and modeling the hydrodynamic and mass-transfer phenomena. *Proceedings of the 8th International Conference on EcoBalance*, pp. 545-548, 10-12 December, 2008, Tokyo, Japan.

Lundell A. and Westerlund T. (2008). Exponential and Power Transformations for Convexifying Signomial Termis in MINLP Problems. *Proceedings of the 27th IASTED MIC Conference*, 154-159. ISBN 978-0-88986.

Bonäs F., Westerlund J. and Westerlund T. (2007). An Optimisation Tool for Allocation Problems. Selected paper in AIDIC Conference Series, **8**, 19-28.

Lastusilta T, Bussieck M. R. and Westerlund T. (2007). Comparison of Some High-Performance MINLP Solvers. *Chemical Engineering Transactions*, **11**, 125-130.

Lundell A. and Westerlund T. (2007). Optimization of Power Transformations in Global Optimization. *Chemical Engineering Transactions*, **11**, 95-100.

Bonäs F., Westerlund J. and Westerlund T. (2007). An Interactive Optimisation Tool for Allocation Problems. *Chemical Engineering Transactions*, **11**, 107-112.

Hästbacka M, Westerlund J. and Westerlund T. (2007). MISPT: A User Friendly MILP Mixed-Time Based Production Planning Tool. *Computer Aided Chemical Engineering*, **24**, 637-642, Elsevier.

Westerlund J., Papageorgiou L. G. and Westerlund T. (2005). A Problem Formulation for Optimal Mixed-Size Box Packing. *Computer Aided Chemical Engineering*, **20**, 913-918, Elsevier.

Westerlund J. , Papageorgiou L. G. and Westerlund T. (2005). A Problem Formulation for Optimal *N*-dimensional Allocation. *Chemical Engineering Transactions*, **6**, 185-190.

Emet S. and Westerlund T. (2005). Modeling and Optimization of A Dynamic Separation Process Using Mixed Integer Nonlinear Programming, *Proceedings of ALGORITMY 2005*, 348-358. ISBN 80-227-2192-1.

Georgiadis M. C., Pistikopoulos E. N., Levis A. A., Papageorgiou L. G., Sequeira S. E., Espufia A., Puigjaner L., Jernström P., Westerlund T., Tsiakis P., Pantelides C. C., Magou I., Efremidis G., Hostrup M., Sanidiotis Y., Lorenz F., Isaksson J. and Finnström T. (2004). Virtual plant-wide management and optimisation of responsive manufacturing networks (VIP-NET): An EC collaborative research project. *Computer Aided Chemical Engineering*, **18**, 913-918, Elsevier.

Westerlund T. and Westerlund J. (2003). GGPECP- A Global Optimization MINLP Algorithm. *Selected paper in AIDIC Conference Series*, **6** , 301-308.

Emet S. and Westerlund T. (2003). Solving an MINLP Problem Including Partial Differential Algebraic Constraints Using Branch and Bound and Cutting Plane Techniques. *Computer Aided Chemical Engineering*, **14**, 107-112, Elsevier.

Jernström P., Westerlund T. and Isaksson J. (2003). A Decomposition Strategy for Solving Multi-Product, Multi-Purpose Scheduling Problems in the Paper Converting Industry. *Computer Aided Chemical Engineering*, **14**, 1031-1036, Elsevier.

Westerlund T. and Westerlund J. (2003). GGPECP- An Algorithm for Solving Non-Convex MINLP Problems by Cutting Plane and Transformation Techniques. *Chemical Engineering Transactions*, **3**, 1045-1050.

Jernström P. and Westerlund T. (2003). A Comparison of Three Different Modeling Approaches for Solving Multi-Product, Multi-Purpose Plant Scheduling. *Proc. FOCAPO 2003*, 319-322.

Björk K-M. and Westerlund T. (2002). Pareto Optimal Solutions in Process Synthesis Problems. *Proc. IASTED MIC*, 204-208, ISSN 1025-8973, ISBN 0-88986-319-9., Acta Press.

Westerlund T., Söderman J. and K-M. Björk (2002). MINLP Models for the Synthesis of Heat Recovery Systems. *AIDIC Conference Series*, **5**, 337-344, ISBN 0390-2358, Elsevier.

Björk K-M., Grossmann I.E. and Westerlund T. (2002). Solving Heat Exchanger Network Synthesis Problems with Non-Constant Heat Capacity Flowrates and Heat Transfer Coefficients. *AIDIC Conference Series*, **5**, 41-48, ISBN 0390-2358, Elsevier.

Karlsson S., Skrifvars H., Pettersson F. and Westerlund T. (2002). Production Planning of a Preparative Sequential SMB Separation Process with MINLP. *AIDIC Conference Series*, **5**, 147-154, ISBN 0390-2358, Elsevier.

Björkqvist J., Roslöf J., Rönnback R. and Westerlund T. (2002). Evaluation of an Iterative Mathematical Optimization Approach for Industrial Size Batch Scheduling. Selected paper in *AIDIC Conference Series*, **5**, 33-40, ISBN 0390-2358, Elsevier.

Björk K-M., Grossmann I.E. and Westerlund T. (2001). A Mathematical Model for the Synthesis of Heat Exchanger Networks with Non-Constant Heat Capacity Flowrates and Heat Transfer Coefficients. *Proc. ICheaP-5*, Vol. 1, 547-552.

Westerlund T., Söderman J. and K-M. Björk (2001). Multi Period MINLP Models for the Synthesis of Heat Recovery Systems. *Proc. ICheaP-5*, Vol. 1, 541-546.

Karlsson S., Skrifvars H., Pettersson F. and Westerlund T. (2001). Production Planning of a Preparative Sequential SMB Separation Process with Mathematical Programming. *Proc. ICheaP-5*, Vol. 1, 465-470.

Björkqvist J., Roslöf J., Rönnback R. and Westerlund T. (2001). Evaluation of an Iterative Mathematical Optimization Approach for Industrial Size Batch Scheduling. *Proc. ICheaP-5*, Vol. 1, 489-494.

Roslöf J., Harjunkoski I. and Westerlund T. (2000). An MILP-Based Reordering Algorithm for Complex Industrial Scheduling and Rescheduling. *Computer Aided Chemical Engineering*, **8**, 13-18, Elsevier.

Karlsson S., Pettersson F., Skrifvars H. and Westerlund T. (2000). Optimizing Operation of Sequential Simulated Moving Bed Process Using MINLP, *Computer Aided Chemical Engineering*, **8**, 463-468, Elsevier.

Westerlund T. and Pörn R. (2000). Mixed Integer Non-linear Programming Using Cutting Plane Techniques. *Computer Aided Chemical Engineering*, **8**, 1-6, Elsevier.

Lee S., Westerlund T. and Grossmann I. E. (2000). Comparison of Algorithms for Generalized Disjunctive Programming Problems. *INFORMS-KORMS SEOUL 2000*, Seoul, Korea June 2000.

Björkqvist J., Karlsson S., Roslöf J., Rönnback R. and Westerlund T. (1999). Applying Iterative and Parallel Methods for Production Planning in the Pharmaceutical Industry. *AIChE 1999 Annual Meeting*.

Söderman J., Westerlund T. and Pettersson F. (1999). Economical Optimization of Heat Recovery Systems for Paper Machine Dryer Sections. *Proceedings PRES'99*, 607-612. ISBN 963-8192-87-9.

Björkqvist J. and Westerlund T. (1999). Parallel Solution of Disjunctive MINLP Problems. *Proc. AIChE Spring meeting*, Ed. Jeffrey J. Siirola, ISBN 0-8169-9861-2, 250-254.

Karlsson S., Pettersson F. and Westerlund T. (1999). Simultaneous Production Planning and Synthesis of a SMB Chromatographic Separation Process with MILP. *Proceedings PI'99*, Vol II, 51-53.

Björkqvist J., Roslöf J., Söderman J., Pettersson F. and Westerlund T. (1999). Mathematical Programming Methods for Industrial Applications. *Proceedings PI'99*, Vol II, 48-50.

Harjunkoski I., Skrifvars H. and Westerlund T. (1998). Improving the Integer Programming Performance in Solving an Industrial Cutting Problem. *Proceedings, 2nd Int. Conf. on Engng. Design, EDA'98*.

Skrifvars H., Harjunkoski I., Östermark R. and Westerlund T. (1998). Comparison of Solving Nonconvex NLP and MINLP Problems with Applications in Process Design. *Proceedings, 2nd Int. Conf. on Engng. Design, EDA'98*.

Harjunkoski I. and Westerlund T. (1998). Solving Trim-Loss Problems with Variable Raw Paper and Trim-Loss Widths. *Proceedings, Foundations of Computer Aided Process Operations, FOCAPO'98*.

Harjunkoski I., Westerlund T., Pörn R. and Skrifvars H. (1997). Solving Trim-Loss Problems with MINLP Methods. Selected paper in AIDIC Conference Series, **2**, 303-310.

Harjunkoski I., Westerlund T., Pörn R. and Skrifvars H. (1997). Solving Trim-Loss Problems with MINLP Methods. *Proc. Europ. Con. Chem. Engng., ECCE 1*, **3**, 1973-1976.

Westerlund T. (1994). Solving Maximum Likelihood Problems by MINLP. *Proceedings of the Thirteenth IASTED International Conference, Modelling, Identification and Control*, 322-324, ISBN: 0-88986-183-8.

Westerlund T. and Pettersson F. (1993). Solving Optimal Flexible Pump Configuration Design Problems by MINLP. *Proceedings of the Twelfth IASTED International Conference, Modelling, Identification and Control*, Acta Press, 172-174.

Kilpinen A., Björkholm T., Westerlund T. (1989). Parallel Calculation of a Packed Bed Reactor. *Proc. of the IASTED Conference on Modeling, Identification and Control.* ISBN 0-88986-113-7, 19-22, Acta Press.

Kilpinen A. and Westerlund T. (1988). Optimization of the Experimental Conditions for Parameter Estimation in a Blast Furnace Model. *Proc. Chem. Data 88*, **1**, 244-249.

Uusi-Honko H., Westerlund T., Saxén H., v.Schalien R. and Fagervik K. (1987). A Thermodynamic Process Interface for Calibrating Industrial Measurements. *Proc. CEF (Chemical Engineering Fundamentals) 87 Congress*, 103-107.

Westerlund T. and Saxén H. (1987). On the Uniqueness in Equilibrium Calculations. *Proc. CEF (Chemical Engineering Fundamentals) 87 Congress*, 325-329.

Westerlund T. (1985). CAPP^3 A Computer Aided Process Planning Program Package. *Proc. Int. AMSE Conf.*, **3B**, 118-125.

Westerlund T., Nyman K.-E. (1984). Experiences with a Self-Tuning Regulator in the Cement Industry. *Proc. MIC'84*, Acta Press, 65-68.

Westerlund T. (1983). Experiences from a digital quality control system for cement kilns. *Proceedings 4th IFAC Symposium on Real Time Digital Control Applications*, 215-219, Pergamon Press.

Westerlund T. (1983). Real Time Optimization of Raw Materials in the Cement Industry. *Proceedings of the 4th IFAC Symposium on Automation in Mining, Mineral and Metal Processing*, 111-115, Pergamon Press.

Westerlund T. (1983). Constrained LQG Control of Industrial Cement Kilns. *Proceedings of the 3rd Conference Optimal Control, Theory and Applications.*

Westerlund T. (Ed.) (1983). *Preprints of the 4th IFAC Symposium on Automation in Mining, Mineral and Metal Processing.*, 726 p.

Mäkilä P., Westerlund T. and Toivonen H. (1982). Constrained Linear Quadratic Gaussian Control. *Proceedings 21th IEEE Conference on Decision and Control*, **1/3**, 312-317.

Westerlund T. (1980). Identification and Control of an Industrial Dry Process Cement Kiln. *Proceedings of the 1980 Joint Automatic Control Conference*, **2**, FP5C, 1-7. (The paper was awarded *The O Hugo Schuck Best Paper Award for 1980* by American Automatic Control Council).

Westerlund T., Toivonen H. and Nyman K.-E. (1979). Stochastic Modelling and Self Tuning Control of a Continuous Cement Raw Material Mixing System. *Proceedings 18th IEEE Conference on Decision and Control*, **1**, 610-615.

Westerlund T. and Toivonen H. (1977). Identification of Linear Discrete Time Multivariable Systems by the Least-Squares Method. *Proc., 6th Nordic Congress on Operations Research.*

Some additional papers

Westerlund T., Hammar T., Löfman N., Karjaluoto J., Åström L. and Haglund T. (1985). Optimization of the Lime Feed in a Recausticizing Plant. *Paper and Timber*, **68**, 828-836.

Westerlund T. (1983). A Model of Pulverized Coal Flames in Rotary Kilns. *Acta Academica Aboensis*, **43**, 6, 1-28.

Westerlund T. (1983). A Dynamic Model for Rotary Kilns. *Acta Academica Aboensis*, **43**, 5, 1-37.

Westerlund T. (1982). KILNMATIC a digital quality control system for cement kilns. *World Cement*, **10**, 327-332.

Toivonen H. and Westerlund T.(1977). The identification of Linear Discrete Time Multivariable Systems by the Least-Squares Method. *Electr. in Fin.*, **50**, 387-394.

Westerlund T. and Toivonen H. (1977). Parameter Estimation with the Recursive Least Squares Method. *Kemia-Kemi*, Vol. **4**, 185-187.

Hammarström L. and Westerlund T. (1976). A Simulation Study of two Algorithms for Identification of Linear Discrete-Time Multi-input Multi-output Systems. *Electr. in Fin.*, **49**, 331-339.

Course books and corresponding publications

Fougstedt A., Lundqvist K. and Westerlund T. (eds.) (2015). Publications from the Process Design and Systems Engineering Laboratory at Åbo Akademi University during 1929-2015. ISBN 978-952-12-3175-9. 81 pages. Juvenes print 2015.

Nyby-Iljin E.-L., Lundqvist K. and Westerlund T. (eds.) (2009). Publications from the Process Design and Systems Engineering Laboratory at Åbo Akademi University during 1929-2009. ISBN 978-952-12-2385-3. 47 pages. Uniprint 2009.

Westerlund T. och Nyby-Iljin Eva-Lena (eds.) (2008). Publications in Process Design and Systems Engineering at Åbo Akademi University during 1923-2008. Collection of 12 volumes. Åbo Akademi University.

Bjondahl F., Westerlund T., Skrifvars H. and Lundqvist K. (2003). Exercises in Process Design and Systems Engineering (in swedish) Övningsarbeten i anläggnings- och apparatteknik. Åbo Akademi University. ISBN 952-12-1130-X. 96p.

Westerlund T. (1988, 1990, 1998, 2001, 2006, 2009 & 2019). *Process Design* (in swedish) *Anläggnings- och apparatteknik*, Course book, Åbo Akademi University. First edition 1988, ISBN 951-649-468-4. 205 p. Second edition 1990, ISBN 951-649-739-X. 210 p. Third edition 1998, ISBN 952-12-0213-0. 247 p. Fourth edition 2001, ISBN 952-12-0829-5. 254 p. Fifth edition 2006, ISBN 952-12-1755-3. 254 p. *Process Design and Systems Engineering* (in swedish) *Anläggnings- och systemteknik*, Sixth edition 2009, 2013, ISBN 978-952-12-23336-5. 254 p. Seventh Printed Edition 2019, ISBN 978-952-12-23336-5. 254 p.

Westerlund T. and Gustafsson T. (1994).*Probability Theory and Statistics* (in swedish) *Sannolikhetslära och matematisk statistik*, Course compendium, Department of Chemical Engineering at Åbo Akademi University, 71 p.

Westerlund T. (1989). *Energy Technology for the Process Industry* (in swedish) *Processindustriell energiteknik*, Course compendium, Åbo Akademi University. ISBN 951-649-540-0. 101 p.

Westerlund T. (ed.) (1986). Computers in Research Work. (in swedish) Datorstöd vid forskningsarbete. Department of Chemical Engineering at Åbo Akademi University, ISBN 951-649-284-3.

Gustafsson S., Hammarström L., Mäkilä P., Toivonen H., Waller K. and Westerlund T. (1981). *Process Control* (in swedish) *Processreglering*. Course compendium Department of Chemical Engineering, Process Control Laboratory, Åbo Akademi University, 151 p.

Myréen B., Ahlbeck J. and Westerlund T. (1977, 1981). *Experimental Design* (in swedish) Kurskompendium i försöksplanering och utvärdering av försöksresultat med den matematiska statistikens metoder. Department of Chemical Engineering, Process Design Laboratory, Åbo Akademi University, 108 p. (New edition 1981).

Nyström L. and Westerlund T. (1980). *Scientific Computing and Programming* (in swedish) *Datoranvändning och programmering*. Course compendium, Department of Chemical Engineering at Åbo Akademi University, 106 p.

Westerlund T. (1980). *Mathematics III* (in swedish) *Matematik III*, *Sannolikhetslära och matematisk statistik*. *Probability Theory and Statistics* (in swedish) Course compendium, Department of Chemical Engineering at Åbo Akademi University, 83 p.

Myréen B., Westerlund T. and Ahlbeck J. (1978). *Thermodynamic Tables* (in swedish), *Termodynamiska Tabeller*. Department of Chemical Engineering, Process Design Laboratory, Åbo Akademi University, 212 p.