

# Profesor Dr. Ion Necoară

## Publicații 2004 - 2016

### Cărți

1. **I. Necoara**, A. Patrascu, *Decomposition Methods for Large Scale Mathematical Optimization*, John Wiley & Sons, in print, 2016.
2. **I. Necoara**, *Model Predictive Control for Hybrid Systems: Piecewise Affine and Max-Plus-Linear Systems*, VDM Verlag, ISBN: 978-363-909-312-4, 2008.

### Capitole de carte

1. **I. Necoara**, A. Patrascu, A. Nedich, *Complexity certifications of first-order inexact Lagrangian methods for general convex programming: application to real-time MPC*, in "Developments in Model-Based Optimization and Control", S. Olaru et al. (Eds.), Lecture Notes in Control and Information Sciences, vol. 464, Springer, 2015.
2. N. Nguyen, S. Olaru, P. Rodriguez-Ayerbe, M. Hovd, **I. Necoara**, *Fully inverse parametric linear/quadratic programming problems via convex liftings*, in "Developments in Model-Based Optimization and Control", S. Olaru et al. (Eds.), Lecture Notes in Control and Information Sciences, vol. 464, Springer, 2015.
3. **I. Necoara**, *Rate analysis of inexact dual fast gradient method for distributed MPC*, in "Distributed MPC made easy", J. Maestre et al. (Eds.), Intelligent Systems, Control and Automation: Science & Engineering, vol. 69, Springer, 2013.
4. **I. Necoara**, *Distributed control over networks using smoothing techniques*, in "Artificial Neural Networks", C. Alippi et al. (Eds.), Lecture Notes in Computer Science, vol. 5769, Springer, 2009.
5. **I. Necoara**, I. Dumitrache, J. Suykens, *Smoothing techniques-based distributed model predictive control algorithms for networks*, in "Sciences, vol. 423, Springer, 2012.
6. I. Dumitrache, **I. Necoara**, S. Caramihai *Time Delay Systems: Methods, Applications and New Trends*, R. Sipahi et al. (Eds.), Lecture Notes in Control and Information, *Hybrid systems*, in "Automatica" vol. II, I. Dumitrache (Eds), Romanian Academy Publishing, 2013.

### Articole în reviste ISI<sup>1</sup>

1. **I. Necoara**, D. Clipici, *Parallel random coordinate descent methods for composite minimization: convergence analysis and error bounds*, SIAM Journal on Optimization, 26(1): 197-226, 2016 (ISSN: 1095-7189, IF<sup>2</sup>=1.8).
2. **I. Necoara**, A. Patrascu, *Iteration complexity analysis of dual first order methods for conic convex programming*, Optimization Methods and Software, 31(3): 645-678, 2016 (ISSN: 1055-6788, IF=1.6).
3. **I. Necoara**, L. Ferranti, T. Keviczky, *An adaptive constraint tightening approach to linear MPC based on approximation algorithms for optimization*, Optimal Control: Applications and Methods, 36(5): 648-666, 2015 (ISSN: 1099-1514, IF= 0.9).

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<sup>1</sup> Cel mai mare factor de impact în Optimizare este în jur de 2 și în Control 3.

<sup>2</sup> Factori de Impact (IF) din 2014.

4. **I. Necoara**, *Computational complexity certification for dual gradient method: application to embedded MPC*, Systems and Control Letters, 81(7): 49-56, 2015 (ISSN:0167-6911, IF.=2.05).
5. **I. Necoara**, V. Nedelcu, *On linear convergence of a distributed dual gradient algorithm for linearly constrained separable convex problems*, Automatica, 55(5): 209-216, 2015 (ISSN: 0005-1098, IF= 3).
6. **I. Necoara**, V. Nedelcu, *Rate analysis of inexact dual first order methods: application to dual decomposition*, IEEE Transactions on Automatic Control, 59(5): 1232-1243, 2014 (ISSN: 0018-9286, IF =2.78).
7. **I. Necoara**, A. Patrascu, *A random coordinate descent algorithm for optimization problems with composite objective function and linear coupled constraints*, Computational Optimization and Applications, 57(2): 307-337, 2014 (ISSN: 0926-6003, IF = 1.3).
8. **I. Necoara**, *Random coordinate descent algorithms for multi-agent convex optimization over networks*, IEEE Transactions on Automatic Control, 58(8): 2001-2012, 2013 (ISSN: 0018-9286, IF=2.78).
9. **I. Necoara**, D. Clipici, *Efficient parallel coordinate descent algorithm for convex optimization problems with separable constraints: application to distributed MPC*, Journal of Process Control, 23(3): 243-253, 2013 (ISSN: 0959-1524, IF =2.65).
10. **I. Necoara**, V. Nedelcu, I. Dumitrache, *Parallel and distributed optimization methods for estimation and control in networks*, Journal of Process Control, 21(5): 756-766, 2011 (ISSN: 0959-1524, IF = 2.65).
11. **I. Necoara**, J.A.K. Suykens, *Interior-point Lagrangian decomposition method for separable convex optimization*, Journal of Optimization Theory and Applications, 143(3): 567–588, 2009 (ISSN: 0022-3239, IF = 1.5).
12. **I. Necoara**, B. De Schutter, T.J.J. van den Boom, J. Hellendoorn, *Robust control of constrained max-plus-linear systems*, International Journal of Robust and Nonlinear Control, 19(2): 218–242, 2009 (ISSN: 1099-1239, IF = 3.1).
13. **I. Necoara**, J.A.K. Suykens, *Application of a smoothing technique to decomposition in convex optimization*, IEEE Transactions on Automatic Control, 53(11): 2674–2679, 2008 (ISSN: 0018-9286, IF = 2.78).
14. **I. Necoara**, T.J.J. van den Boom, B. De Schutter, H. Hellendoorn, *Stabilization of maxplus-linear systems using model predictive control: The unconstrained case*, Automatica, 44(4): 971-981, 2008 (ISSN: 0005-1098, IF = 3).
15. **I. Necoara**, B. De Schutter, T.J.J. van den Boom, H. Hellendoorn, *Model predictive control for uncertain maxmin-plus-scaling systems*, International Journal of Control, 81(5): 701-713, 2008 (ISSN: 0020-7179, IF = 1.65).
16. **I. Necoara**, E.C. Kerrigan, B. De Schutter, T.J.J. van den Boom, *Finite-horizon min-max control of max-plus-linear systems*, IEEE Transactions on Automatic Control, 52(6): 1088-1093, 2007 (ISSN: 0018-9286, IF = 2.7).
17. **I. Necoara**, B. De Schutter, T.J.J. van den Boom, J. Hellendoorn, *Stable Model Predictive Control for Constrained Max-Plus-Linear Systems*, Discrete Event Dynamic Systems: Theory and Applications, 17(3): 329-354, 2007 (ISSN: 0924-6703, IF = 1.3).
18. A. Patrascu, **I. Necoara**, Q. Tran-Dinh, *Adaptive inexact fast augmented Lagrangian methods for constrained convex optimization*, Optimization Letters, doi:10.1007/s11590-016-1024-6, 1-15, 2016 (ISSN: 1862-4472, IF=0.93).
19. Q. Tran-Dinh, **I. Necoara**, M. Diehl, *Fast Inexact Decomposition Algorithms For Large- Scale Separable Convex Optimization*, J. Optimization, 25(2): 325–356, 2016 (ISSN: 0233-1934, IF=0.93).
20. A. Patrascu, **I. Necoara**, *Random coordinate descent methods for l0 regularized convex optimization*, IEEE Transactions on Automatic Control, 60(7): 1811–1824, 2015 (ISSN: 0018-9286, IF=2.78)

21. A. Patrascu, **I. Necoara**, *Efficient random coordinate descent algorithms for large-scale structured nonconvex optimization*, Journal of Global Optimization, 61(1): 19–46, 2015 (ISSN: 0925-5001, IF=1.307).
22. V. Nedelcu, **I. Necoara**, Q. Tran-Dinh, *Computational complexity of inexact gradient augmented Lagrangian methods: application to constrained MPC*, SIAM Journal on Control and Optimization, 52(5): 3109-3134, 2014 (ISSN: 0363-0129, IF=1.38).
23. Q. Tran-Dinh, **I. Necoara**, M. Diehl, *Path-Following Gradient-Based Decomposition Algorithms For Separable Convex Optimization*, Journal of Global Optimization, 59(1): 59-80, 2014, (ISSN: 0925-5001, IF=1.307).
24. Q. Tran-Dinh, **I. Necoara**, I. Savorgnan, M. Diehl, *An inexact Perturbed Path-Following Method for Lagrangian Decomposition in Large-Scale Separable Convex Optimization*, SIAM Journal on Optimization, 23(1): 95–125, 2013 (ISSN: 1052-6234, IF= 2.1).
25. P. Tsiaflakis, **I. Necoara**, J.A.K. Suykens, M. Moonen, *Improved Dual Decomposition Based Optimization for DSL Dynamic Spectrum Management*, IEEE Transactions on Signal Processing, 58(4): 2230–2245, 2010 (ISSN: 1053-587X, IF = 3.1).
26. M. Baes, M. Diehl, **I. Necoara**, *Every nonlinear control system can be obtained by parametric convex programming*, IEEE Transaction on Automatic Control, 53(8): 1963–1967, 2008 (ISSN: 0018-9286, IF = 2.78).

#### Articole în conferințe ISI (CDC, ACC, ECC)

1. **I. Necoara**, *Distributed and parallel random coordinate descent methods for huge convex programming over networks*, invited paper in session “Randomized algorithms for distributed computation over networks”, Proceedings of Conference on Decision and Control, 2015 (ISI<sup>3</sup>, ieeexplore).
2. **I. Necoara**, A. Patrascu, *On the behavior of first-order penalty methods for conic convex programming when Lagrange multipliers do not exist*, invited paper in session “Large scale optimization”, Proceedings of Conference on Decision and Control, 2015 (ISI, ieeexplore).
3. **I. Necoara**, Sverre Kvamme, *DuQuad: a toolbox for solving convex quadratic programs using dual first order algorithms*, Proceedings of Conference on Decision and Control, 2015 (ISI, ieeexplore).
4. **I. Necoara**, A. Patrascu, R. Findeisen, *Rate of convergence analysis of a dual fast gradient method for general convex optimization*, Proceedings of Conference on Decision and Control, 2015, (ISI, ieeexplore).
5. **I. Necoara**, A. Nedich, *A fully distributed dual gradient method with linear convergence for large-scale separable convex problems*, Proceedings of European Control Conference, 2015 (ISI, ieeexplore).
6. **I. Necoara**, R. Findeisen, *Parallel and distributed random coordinate descent method for convex error bound minimization*, Proceedings of American Control Conference, 2015 (ISI, ieeexplore).
7. A. Patrascu, **I. Necoara**, P. Patrinos, *A proximal alternating minimization method for  $\ell_0$  regularized nonlinear optimization problems: application to state estimation*, Proceedings of Conference on Decision and Control, 2014 (ISI, ieeexplore).
8. N.A. Nguyen, S. Olaru, P. Rodriguez-Ayerbe, M. Hovd, **I. Necoara**, *On the lifting problems and their connexions with piecewise affine control law design*, Proceedings of European Control Conference, 2014 (ISI, ieeexplore).
9. Q. Tran-Dinh, **I. Necoara**, M. Diehl, *A dual decomposition algorithm for separable nonconvex optimization using the penalty function framework*, Proceedings of Conference on Decision and Control, 2013 (ISI, ieeexplore).

<sup>3</sup> Conference on Decision and Control (CDC), American Control Conference (ACC), European Control Conference (ECC) sunt cele mai bune in domeniul controlului si sunt indexate ISI.

10. **I. Necoara**, V. Nedelcu, T. Keviczky, M. Dang Doan, B. de Schutter, *Linear model predictive control based on approximate optimal control inputs and constraint tightening*, Proceedings of Conference on Decision and Control 2013 (ISI, ieeexplore).
11. **I. Necoara**, V. Nedelcu, D. Clipici, *Feasible distributed MPC scheme for network systems based on an inexact dual gradient method*, Proceedings of Asian Control Conference, 2013 (ISI, ieeexplore).
12. **I. Necoara**, D. Clipici, *A computationally efficient parallel coordinate descent algorithm for MPC implementation on a PLC*, Proceedings of European Control Conference, 2013 (ISI, ieeexplore).
13. A. Patrascu, **I. Necoara**, *A random coordinate descent algorithm for large-scale sparse nonconvex optimization*, Proceedings of European Control Conference, 2013 (ISI, ieeexplore).
14. **I. Necoara**, D. Clipici, S. Olaru, *Distributed model predictive control of leader-follower systems using an interior point method with efficient computations*, Proceedings of American Control Conference, 2013 (ISI, ieeexplore).
15. **I. Necoara**, *Suboptimal distributedMPC based on a block-coordinate descent method with feasibility and stability guarantees*, Proceedings of Conference on Decision and Control, 2012 (ISI, ieeexplore).
16. **I. Necoara**, *A random coordinate descent method for large-scale resource allocation problems*, Proceedings of Conference on Decision and Control, 2012 (ISI, ieeexplore).
17. V. Nedelcu, **I. Necoara**, *Iteration Complexity of an Inexact Augmented LagrangianMethod for Constrained MPC*, Proceedings of Conference on Decision and Control, 2012 (ISI, ieeexplore).
18. A. Hanchevici, **I. Necoara**, *Networked Control Strategies for a 3 Dimensional Crane*, Proceedings of Conference on Control Applications, 2012 (ISI, ieeexplore).
19. M. Cornoiu, **I. Necoara**, *An adaptive approximation method for Hammerstein systems identification*, in Proceedings of Conference on Control Applications, 2012 (ISI, ieeexplore).
20. **I. Necoara**, I. Dumitrache, J. A. K. Suykens, *Fast primal-dual projected linear iterations for distributed consensus in constrained convex optimization*, Proceedings of Conference on Decision and Control, 2010 (ISI, ieeexplore).
21. P. Tsiaflakis, **I. Necoara**, J. Suykens, M. Moonen, *An improved dual decomposition approach to DSL dynamic spectrum management*, in Proceedings of 17th European Signal Processing Conference, pp. 2087-2091, 2009 (ISI, ieeexplore).
22. **I. Necoara**, C. Savorgnan, Q. Tran-Dinh, J. Suykens, M. Diehl, *Distributed Nonlinear Optimal Control using Sequential Convex Programming and Smoothing Techniques*, Proceedings of Conference on Decision and Control, 2009 (ISI, ieeexplore).
23. **I. Necoara**, J.A.K. Suykens, *A dual interior-point distributed algorithm for large-scale data networks optimization*, in Proceedings of European Control Conference, 2009.
24. **I. Necoara**, J.A.K. Suykens, *A proximal center-based decomposition method for multiagent convex optimization*, Proceedings of Conference on Decision and Control, 2008 (ISI, ieeexplore).
25. **I. Necoara**, D. Doan, J.A.K. Suykens, *Application of the proximal center decomposition method to distributedmodel predictive control*, Proceedings of IEEE Conference on Decision and Control, 2008 (ISI, ieeexplore).
26. **I. Necoara**, E.C. Kerrigan, B. De Schutter, T.J.J. van den Boom, *Worst-case optimal control of uncertain max-plus-linear systems*, Proceedings of Conference on Decision and Control, 2006 (ISI, ieeexplore).
27. D. Corona, **I. Necoara**, B. De Schutter, T.J.J. van den Boom, *Robust hybrid model predictive control applied to the design of an adaptive cruise controller for a road vehicle*, Proceedings of Conference on Decision and Control, 2006 (ISI, ieeexplore).
28. **I. Necoara**, B. De Schutter, T.J.J. van den Boom, J. Hellendoorn, *Stable receding horizon control for max-plus-linear systems*, Proceedings of American Control Conference, 2006 (ISI, ieeexplore).
29. **I. Necoara**, B. De Schutter, T.J.J. van den Boom, J. Hellendoorn, *Robustly stabilizing model predictive control for perturbed piecewise linear systems*, Proceedings of Conference on Decision and Control, 2005 (ISI, ieeexplore).

30. T.J.J. van den Boom, B. De Schutter, **I. Necoara**, *On MPC for max-plus-linear systems: Analytic solution and stability*, Proceedings of Conference on Decision and Control, 2005 (ISI, ieeexplore).

### Lucrări invitate la conferințe

1. **I. Necoara**, Yu.Nesterov, F. Glineur, *Linear convergence of first order methods for nonstrongly convex optimization*, invited paper in session “Recent advances on convergence rates of first-order methods” at International Conference on Continuous Optimization, 2016.
2. **Necoara**, *Linear convergence of gradient type methods for non-strongly convex optimization*, invited paper in session “Analyse non-lisse et optimisation” at Colloque Franco-Roumain de Mathematiques Appliquees, 2016.
3. **I. Necoara**, A. Patrascu, F. Glineur, *Complexity of first order inexact Lagrangian and penalty methods for conic convex programming*, invited paper in session “First order methods for convex optimization problems” at European Conference on Operational Research, 2016.
4. **I. Necoara**, *Distributed and parallel random coordinate descent methods for huge convex programming over networks*, invited paper in session “Randomized algorithms for distributed computation over networks” at Conference on Decision and Control, 2015.
5. **I. Necoara**, A. Patrascu, *On the behavior of first-order penalty methods for conic convex programming when Lagrange multipliers do not exist*, invited paper in session “Large scale optimization II” at Conference on Decision and Control, 2015.
6. **I. Necoara**, A. Patrascu, *Random coordinate descent methods for sparse optimization: application to sparse control*, invited paper in session “Optimization in Engineering” at International Conference on Control Systems and Computer Science, 2015.
7. **I. Necoara**, *Complexity of an Inexact Augmented Lagrangian method: application to constrained MPC*, invited paper in session “Model Predictive Control for Embedded Systems” at IFAC World Congress, 2014.
8. **I. Necoara**, *Worst-case computational complexity analysis for embedded MPC based on dual gradient method*, invited paper in session “Embedded Systems” at International Conference on System Theory, Control and Computing, 2014, **received Best Paper Award**.
9. A. Patrascu, **I. Necoara**, *Coordinate descent methods for  $\ell_0$  regularized optimization problems*, invited paper in session “Coordinate Descent Methods: Sparsity, Nonconvexity and Applications” at SIAM Conference on Optimization, 2014.
10. **I. Necoara**, Y. Nesterov, F. Glineur, *A random coordinate descent method on large optimization problems with linear constraints*, invited paper in session “Dual and Coordinate Descent Methods” at International Conference on Continuous Optimization, 2013.
11. Q. Tran-Dinh, **I. Necoara**, M. Diehl, *Fast decomposition algorithms for large-scale separable convex optimization*, invited paper in session “Distributed Algorithms for Constrained Convex Problems over Networks” at International Conference on Continuous Optimization, 2013.
12. A. Patrascu, **I. Necoara**, *A random coordinate descent algorithm for optimization problems with composite objective function and linear coupled constraints*, invited paper in session “Convex optimization in machine learning” at International Conference on Continuous Optimization, 2013.
13. **I. Necoara**, A. Patrascu, *A Random Coordinate Descent Algorithm for Large-Scale Sparse Nonconvex Optimization*, invited paper in session “Distributed Control and Optimization” at European Control Conference, 2013
14. **I. Necoara**, J. Suykens, *A primal-dual based consensus algorithm in convex feasibility*, invited paper in session “Distributed Optimization Algorithms”, at Belgian-French-German Conference on Optimization, 2009.

### **Proiecte de cercetare – director**

1. 2015-2017, Modeling, Control and Optimization for Big Data Systems (MoCOBiDS), PN II-RU-TE 2014, UEFISCDI, Romania, no. 176/01.10.2015.
2. 2014-2015 and 2016-2018, *Programme de cooperation scientifique entre L'Academie roumaine, WBI et le FRS/FNRS*, Belgium, collaboration Prof. Nesterov & Glineur from Universite Catholique Louvain.
3. 2010-2013, *Embedded Optimization for Resource Constrained Platforms (EMBOCON)*, European Commission, FP7 - ICT (STREP), Grant Agreement no. 248940.
4. 2010-2012, *Embedded Optimization for Resource Constrained Platforms (EMBOCON)*, ANCS, PN II, no. 80EU/17.06.2010
5. 2010-2013, *Mathematical Engineering Tools for Estimation and Control in Networks (METNet)*, PN II-RU-TE 2010, UEFISCDI, Romania, no. 19/11.08.2010.