

■ TA-14

Tuesday, 8:30-10:00

RB-Omega

Scheduling with variable parameters II

Stream: Scheduling under Resource Constraints
Invited session

Chair: *Yakov Shafransky*, United Institute of Informatics Problems, National Academy of Sciences of Belarus, Surganov str. 6, 220012 Minsk, Belarus, 220012, Minsk, Belarus, shafr-04@yandex.ru

Chair: *Stanislaw Gawiejnowicz*, Faculty of Mathematics and Computer Science, Adam Mickiewicz University, Umultowska 87, 61-614, Poznan, Poland, stgawiej@amu.edu.pl

1 - Minimizing Maximum Lateness for Single Machine under Uncertain Due Dates and Precedence Constraints

Dzmitry Sledneu, Lund University, Sweden, dzmitry.sledneu@gmail.com, *Yakov Shafransky*

Problem of minimizing maximum lateness for one machine under precedence constraints is considered. For each due date we have an interval of its possible values and the due date may take any value from this interval regardless of the will of the decision maker. A feasible schedule is called globally optimal schedule if it remains optimal under any possible values of the due dates. We formulate necessary and sufficient conditions for a schedule to be globally optimal and propose an algorithm for constructing such a schedule. As a by-product, we formulate necessary and sufficient conditions for the optimality of a schedule for the deterministic version of the problem.

2 - Scheduling precedence-constrained jobs with mixed processing times and maximum cost criterion

Marek Dębczyński, Faculty of Mathematics and Computer Science, Adam Mickiewicz University, Umultowska 87 Street, 61-614, Poznań, Wielkopolskie, Poland, mdeb@amu.edu.pl, *Stanislaw Gawiejnowicz*

We consider single-machine scheduling problems with arbitrary precedence constraints and maximum cost criterion. We show how to solve the problems in polynomial time when job processing times are variable and mixed, i.e. some of them are fixed, while the other ones are variable and take into account the effects of learning, ageing or job deterioration.

3 - Scheduling jobs on unrelated parallel machines with general positional deterioration to minimize the total processing cost

Yakov Shafransky, United Institute of Informatics Problems, National Academy of Sciences of Belarus, Surganov str. 6, 220012 Minsk, Belarus, 220012, Minsk, Belarus, shafr-04@yandex.ru

Set of independent jobs is to be processed on unrelated parallel machines. The processing time of a job is the product of its basic processing time and a deterioration coefficient that depends on the job, on the machine and on the position of the job in the job sequence on this machine. Each of the coefficients is a non-decreasing function of the position number. For each machine, we have a cost of processing a job for one time unit on the machine. The aim is to construct a schedule that minimizes the total cost of processing all the jobs. We propose a polynomial algorithm to solve the problem

4 - Multicriteria optimisation of construction project schedules

Grzegorz Ginda, Faculty of Materials and Environment Sciences, University of Bielsko-Biała, INSTITUTE OF TEXTILE ENGINEERING AND POLYMER MATERIALS, Pl.Fabryczny 5, 43-300, Bielsko-Biała, Poland, gg.ginda@gmail.com, *Mirosław Dytczak*, *Tomasz Wojtkiewicz*

Complexity of optimal construction project scheduling results from numerous feasible orders of technological operations, availability of different operation realisation modes and possible concurrency among

operations due to limited availability of resources. Efficient approach is discussed which allows identification of the most suitable project schedule instances. It applies simultaneous generation and evaluation of representative population of schedule instances. A criteria hierarchy is applied with this regard. The approach also facilitates identification of desirable schedule features.

■ TA-15

Tuesday, 8:30-10:00

RB-2101

Semi-infinite methods and applications

Stream: Semi-Infinite Optimization
Invited session

Chair: *Ana I. Pereira*, Department of Mathematics - ESTiG, Polytechnic Institute of Braganca, Campus de Sta Apolonia, Apartado 134, 5301-857, Braganca, Portugal, apereira@ipb.pt

1 - Strong duality in robust linear semi-infinite programming

Miguel Goberna, Estadística e Investigación Operativa, Universidad de Alicante, Ctra. San Vicente s/n, 03080, San Vicente del Raspeig, Alicante, Spain, mgoberna@ua.es

In this talk, we propose a duality theory for semi-infinite linear programming problems under uncertainty in the constraint functions, the objective function, or both, within the framework of robust optimization. We show that robust duality holds whenever a robust moment cone is closed and convex. We then show that robust moment cone is closed and convex if and only if robust duality holds for every linear objective function of the program. We also give robust forms of the Farkas lemma for systems of uncertain semi-infinite linear inequalities.

2 - General semi-infinite programming

Vladimir Shikhman, Dept. Mathematics C, RWTH Aachen University, Templergraben 55, 52056, Aachen, Germany, shikhman@mathc.rwth-aachen.de, *Hubertus Th. Jongen*

We consider general semi-infinite programming (GSIP) from a topological point of view. We focus on the description of the closure of the feasible set, the Symmetric Mangasarian Fromovitz Constraint Qualification, the Nonsmooth Symmetric Reduction Ansatz, appropriate notion of Karush-Kuhn-Tucker points and critical point theory.

3 - Reduction method with multistart technique for semi-infinite programming problems

Ana I. Pereira, Department of Mathematics - ESTiG, Polytechnic Institute of Braganca, Campus de Sta Apolonia, Apartado 134, 5301-857, Braganca, Portugal, apereira@ipb.pt, *Florabela P. Fernandes*, *M. Fernanda P. Costa*, *Edite M.G.P. Fernandes*

Semi-infinite programming problems can be efficiently solved by reduction type methods. In this work a new global reduction method for semi-infinite programming is presented. The multilocal optimization is carried out with a multistart technique and the reduced problem is approximately solved by a primal-dual interior point method combined with a two-dimensional filter line search strategy. The filter strategy is used to promote the global convergence of the algorithm. Numerical experiments with a set of well-known problems are shown and comparisons with other methods are presented.

4 - Study of optimization problems with analytic constraint functions

Tatiana Tchemisova, Departamento de Matemáticas, University of Aveiro, Campus Universitario de Santiago, 3810-193, Aveiro, Portugal, tatiana@ua.pt, *Olga Kostyukova*

For convex SIP problems with analytic constraint functions, we apply our approach based on the notion of immobile indices and their immobility orders. Implicit Optimality Criterion proved for the general case of problems with 1-dimensional index set allows to replace testing optimality in the convex SIP by testing in a special nonlinear problem. We study some specific properties of this problem and prove new optimality conditions. Special attention is paid to the case when the constraints of the original SIP are presented by analytic functions and do not satisfy the Slater condition.