optimize multi-period problems, where some kind of randomness should be considered at every stage of decision making because the decisions are chained together in the state space. Curse of dimensionality is a common observed character of an SDP, where it refers to the need of checking an exponentially growing number of decisions as the algorithm goes from one stage to the next stage. Hence, the SDP normally either encounters with memory overflow or will take long because it needs an exponential order of computations. None of these phenomenons is desired for practitioners. Thus, if it becomes possible to skip checking the set of non-optimal decisions for a given set of states at some intermediary stages, the SDP can cope with curse of dimensionality, where it can find the optimal policy in a practically reasonable amount of CPU time. In this talk, a production planning problem is studied under the assumption that the lifespan of a unit of inventory is a random variable which follows a general finite discrete probability distribution function. The production manager wants to minimize the (expected) total cost due to setups, production, inventory holding, shortages and inventory perishability, while taking into account the fact that a random number of product units in the inventory can perish independently in every period. The trade-off between different costs makes it hard to determine the optimal policy, while for every decision about the inventory volume, there are different probabilistic consequences and vice versa.

3 - Partitioned Subgradient Methods for Stochastic Mixed Integer Program duals
Speaker: Cong Han Lim, UW-Madison, US, talk 1196
Co-Authors: Jeff Linderoth, Jim Luedtke, Stephen Wright.
We present our work on improving the subgradient method for handling consensus problems with difficult subproblems, a special case of which includes the Langrangian dual of a stochastic mixed-integer program. In particular, we describe a simple partitioning-based framework for subgradient algorithms that allows them to run more efficiently in a distributed or multi-core setting. We focus on a simple partitioned variant of the standard subgradient method and discuss extensions. Computational results on some larger instances of SIPLIB problems will be shown.

4 - Lagrangian dual decision rules for multistage stochastic integer programs
Speaker: Jim Luedtke, University of Wisconsin-Madison, US, talk 104
Co-Authors: Merve Bodur, Maryam Daryalal.
We consider Lagrangian dual decision rules for multi-stage stochastic integer programming problems. We investigate techniques for using these decision rules to obtain bounds on the optimal solution and a primal policy, and compare the strength of the relaxation obtained from different techniques. Preliminary numerical results will be presented.

Convexity and Polytopes

1-Box-Total Dual Integrality and k-Edge-Connectivity

Speaker: Emiliano Lancini, LIPN - Université Paris 13, FR, talk 1651
Co-Authors: Roland Grappe, Mathieu Lacroix, Michele Barbato, Roberto Wolfe, Fabio Santos.
The concept of total dual integrality dates back to the works of Edmonds, Giles and Pulleyblank in the late 70’s, and is strongly connected to min-max relations in combinatorial optimization. In this work we show a characterization of series-parallel graphs in terms of box-total dual integrality of the k-edge-connected spanning subgraph polyhedron. The system $Ax \geq b$ is totally dual integral (TDI) if, for each integer vector $c$ for which $\min(\{x : Ax \geq b\})$ is finite, there exists an integer optimal solution of $\max(\{y : yA = c, y \geq 0\})$ such that:

$$\min(\{x : Ax \geq b\}) = \max(\{y : yA = c, y \geq 0\})$$

It is known that every integer polyhedron can be described by a TDI system $Ax \geq b$ with $A$ and $b$ integer. The integrality of the TDI system is desirable because, then we have a min-max relation between combinatorial objects. We are interested in the stronger property of box-TDIness. A system $Ax \geq b$ is called box-TDI if the system $Ax \geq b, \ell \leq x \leq u$ is TDI for all rational vectors $\ell$ and $u$. A polyhedron that can be described by box-TDI system is called a box-TDI polyhedron. This definition is motivated by the fact that any TDI system describing a box-TDI polyhedron is box-TDI. The past few years, this property has received a renewed interest and several new box-TDI systems were discovered. We prove that, for $k \geq 2$, the k-edge-connected spanning subgraph polyhedron is a box-TDI polyhedron if and only if the graph is series-parallel. Moreover, in this case, we provide a box-TDI system with integer coefficients describing this polyhedron.

2- On the Circuit Diameter Conjecture

Speaker: Tamon Stephen, Simon Fraser University, CA, talk 1403
A key concept in optimization is the combinatorial diameter of a polyhedron. From the point of view of optimization, we would like to relate it to the number of facets $f$ and dimension $d$ of the polyhedron. In the seminal paper of Klee and Walkup, the Hirsch conjecture, that the bound is $f - d$, was shown to be equivalent to several seemingly simpler statements, and was disproved for unbounded polyhedra through the construction of a particular 4-dimensional polyhedron with 8 facets. The Hirsch bound for polytopes was only recently narrowly exceed by Santos. We consider analogous questions for a variant of the combinatorial diameter called the circuit diameter. In this variant, paths are built from the circuit directions of the polyhedron, and can travel through the interior. We show that many of the Klee-Walkup results and techniques translate to the circuit setting. However, in this setting we are able to verify the 4-dimensional version of a $d$-step conjecture for unbounded polytopes, which fails in the combinatorial case. This is joint work with Steffen Borgwardt and Timothy Yusun.