

# VORträge zum Operations Research

Kolloquium des Instituts für Operations Research

*Zeit:* Donnerstag, 24. Mai 2012, 17:30 Uhr  
*Ort:* Raum 111, Gebäude 20.13  
*Es spricht:* Prof. Dr. Josef Kallrath, BASF SE Ludwigshafen  
*Zum Thema:* **Modeling and Solving Real World Optimization Problems - Are Educational, Scientific and Industrial Needs Compatible?**

*Abstract:* This lecture will transmit a sense of the requirements to solve real world decision or optimization problems using mathematical optimization methods. Among them are advanced modeling skills, familiarity with algebraic modeling languages and the ability to develop tailor-made methods.

Proper organization, planning and design of production, storage locations, transportation and scheduling are vital to retain the competitive edge of companies in the global economy. In supply chain optimization large-scale multi-stage production planning problems with several sites, products and periods can be solved as monolithic mixed integer linear programming problems. Other problems such as process design, process synthesis and multi-component blended-flow problems leading to nonlinear or even mixed integer nonlinear models.

Many industrial or societal problems are, however, so complicated that they need tailor-made methods. Therefore, we put a focus on the importance of modeling and the development of tailor-made methods. Based on the Greek term monolithos (stone consisting of one single block) we introduce the term polyolithic for modeling and solution approaches in which mixed integer or non-convex nonlinear optimization problems are solved by tailor-made methods involving several models and/or algorithmic components, in which the solution of one model is input to another one. This can be exploited to initialize certain variables, or to provide bounds on them (problemspecific preprocessing). Mathematical examples of polyolithic approaches are decomposition techniques, or hybrid methods in which constructive heuristics and local search improvement methods are coupled with exact mixed integer programming algorithms. In this talk we present illustrative examples from the paper and metals industries, an energy portfolio problem with an embedded unit commitment problem, and a scheduling problem in the energy industry and demonstrate that modeling and the development of tailor-made methods require a lot of experience. This experience is difficult to obtain in only a few years students spend at the university. Industrial problem owner are usually impatient when it comes to the solution of their problems. Difficult problems need time to be analyzed and solved properly. Thus, modeling and solving real world optimization problems is not only an art regarding the mathematical techniques but also a very challenging mission in the triangle conflict of nowadays educational, scientific and industrial constraints and interests.

## Die Vorträge zum Operations Research wenden sich an alle Interessierten!

Ab 17:00 Uhr ist am Institut für Operations Research (Gebäude 20.13, Raum 104) Gelegenheit zu einem Gespräch mit dem Referenten bei einer Tasse Kaffee gegeben.

Bei Rückfragen wenden Sie sich bitte an:  
Prof. Dr. Oliver Stein, Institut für Operations Research.