A constraint aggregation strategy for nonlinear programming

Lorenz T Biegler
lb01@andrew.cmu.edu
Carnegie Mellon University, USA

This talk presents a novel constraint aggregation strategy for chemical process optimization. Based on a function proposed by Kreisselmeier and Steinhauser, this KS function provides an aggregation for a large set of inequality constraints. The resulting KS constraint overapproximates the feasible region and becomes a tight constraint through the use of a limiting parameter. Testing on a common set of NLP problems shows that this approach can be very effective for process optimization.

Applications of the KS function are provided for two optimization problems in chemical engineering. In the first, optimal control problems with path constraints are aggregated and solved. Here this approach allows the efficient use of an adjoint sensitivity strategy. In the second example, we consider the design of a chemical reactor. Modeled as a set of PDEs and solved by finite elements, this optimization problem benefits greatly from the addition of KS constraints.

Future work in the application of KS functions will also be sketched and preliminary results will be highlighted.