Large-Scale Nonlinear Programming for Multiperiod Optimization and Design under Uncertainty

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Abstract: Multiperiod or Multi-scenario optimization is a convenient way to formulate engineering optimization problems that need to operate under a variety of different conditions. Moreover, this formulation is often an essential tool to deal with semi-infinite problems. Here we adapt the IPOPT barrier algorithm for nonlinear programming to deal with multi-scenario problems. The recently developed object oriented software, IPOPT 3.0, makes this task reasonably straightforward. Moreover, in addition to exploiting the structure of this method, we develop a parallel implementation for large-scale applications. A number of examples drawn from process engineering and water network identification are used to demonstrate the effectiveness of this approach.

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