

1107-90-189

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22205. *Practical Challenges in Using Multilevel Optimization.*

A PDE-constrained optimization problem can be considered as a family of optimization models obtained by varying the discretization. Multilevel optimization methods can be applied to such problems, and have the potential for dramatically reducing the effort required to find an optimal solution. In principle, applying multilevel optimization is straightforward, since the algorithms can be described in abstract terms and have considerable flexibility. However, there are practical challenges. These include scaling of the individual optimization models, smoothness of constraint surfaces, and gradient computations. These challenges are not insurmountable, but they can be easy to overlook. (Received January 14, 2015)