Ideas in multilevel optimization

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A review of some recent ideas for exploiting the multilevel structure in nonlinear optimization will be discussed. In many case, optimization problems involve variables which correspond to a discretization of an underlying continuous problem, and more than one level of discretization may be considered. We will briefly discuss three approaches which attempt to exploit this structure, in different algorithmic contexts. The first is that of trust-region methods for (possibly bound-constrained) optimization and the second is that of variable-metric methods for unconstrained problems. The third is simpler (a more standard mesh refinement scheme) but operates in the observation space of large-scale data fitting problems.