

Gilmore, P.; Kelley, C. T.

An implicit filtering algorithm for optimization of functions with many local minima. (English) [Zbl 0828.65064](#)

SIAM J. Optim. 5, No. 2, 269-285 (1995).

The paper is concerned with the minimization of a function f subject to simple bound constraints: $x \in \Omega = \{x \mid e^i \leq x^i \leq u^i\}$, where x^i denotes the i th component of the vector $x \in \mathbb{R}^n$, but that $\hat{f} = f + \phi$, where ϕ is small in magnitude relative to f but has high frequency oscillations that cause local minima.

One way to avoid such local minima is to filter the high frequency components from some expansion of \hat{f} . In the filtering algorithm proposed in this paper, a finite difference projected gradient- Armijo method is used with a step size in the difference chosen as it would be if ϕ were floating point round-off. The strategy for selection of the decreasing sequence of the step sizes is a heuristic one.

The iterative process is terminated after a predetermined value of the step size is reached or when no further progress is being made. The algorithm is called “implicit filtering” because the differencing is used to “step over” the noise ϕ at varying levels of resolution, hence implicitly filtering the objective. The performance of the algorithm in the terminal phase of the iteration can be accelerated by a quasi-Newton method.

Reviewer: [F.Luban \(București\)](#)

MSC:

[65K05](#) Numerical mathematical programming methods
[90C30](#) Nonlinear programming

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