Margaret Wright
Faculty Research Presentation
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Research area: *Non-derivative methods* for unconstrained optimization: minimize$_{x \in \Re^n}$ $f(x)$

The niche:

- f is *very* expensive to calculate
- f is unpredictably nonsmooth, undefined, discontinuous, or noisy

Practitioners have *loved* these methods for more than 50 years, but there were very few theoretical results until the 1990s.

Many open questions remain, including:

1. "Realistic" convergence proofs. (One person's reality is another person's fantasy. . .)

   • • • "Convergence of the restricted Nelder-Mead algorithm in two dimensions", J. Lagarias (Michigan), B. Poonen (Berkeley), and MHW (2008) • • •

2. Analysis of behavior patterns in practice.

3. Reliable computational tests to distinguish good behavior from bad.