

## A new gradient method via least change secant update

### ABSTRACT

The Barzilai–Borwein (BB) gradient method is favourable over the classical steepest descent method both in theory and in real computations. This method takes a ‘fixed’ step size rather than following a set of line search rules to ensure convergence. Along this line, we present a new approach for the two-point approximation to the quasi-Newton equation within the BB framework on the basis of a well-known least change result for the Davidon–Fletcher–Powell update and propose a new gradient method that belongs to the same class of BB gradient method in which the line search procedure is replaced by a fixed step size. Some preliminary numerical results suggest that improvements have been achieved.

**Keyword:** Gradient methods; Barzilai–Borwein method; Conjugate gradient method; Quasi-Newton equation; Least change update