

OPTIMIZATION

Samira . Maalek

I-Long Search(LS) parameters based on strong wolf condition for Steepest Decsent(SD):

$\tau_1 = 9$, ε (for sectioning) $= 10^{-5}$, $c_2 = 10^{-4}$, $c_2 = 0.1$, ε (stop tol) $= 10^{-3}$

II-Long Search(LS) parameters based on strong wolf condition for Newton and BFGS:

$\tau_1 = 9$, ε (for sectioning) $= 10^{-5}$, $c_2 = 10^{-4}$, $c_2 = 0.9$, ε (stop tol) $= 10^{-3}$

In the first step we set $\Delta f=100$, and update it in the next steps with $f(x_{k+1}) - f(x_k)$. In the BFGS algorithm for first step we set $C_0=I$ and update it in the nest steps.

TABLE 1. Simulation results for BFGS.

BFGS	x_{\min}	f_{\min}	iteration	Function evaluation	Gradient evaluation	Hessian evaluation
Rosenbrock(withLS)	$\begin{bmatrix} 1.000 \\ 1.000 \end{bmatrix}$	$3.7291 \cdot 10^{-11}$	28	30	29	0
Powel (with LS)	$\begin{bmatrix} 0.0387 \\ -0.0039 \\ 0.0137 \\ 0.0137 \end{bmatrix}$	$4.8801 \cdot 10^{-6}$	24	26	26	0

TABLE 2. Simulation results for SD.

SD	x_{\min}	f_{\min}	iteration	Function evaluation	Gradient evaluation	Hessian evaluation
Rosenbrock(withGSS)	$\begin{bmatrix} 1.3505 \\ 1.8242 \end{bmatrix}$	0.1228	2	54	2	0
Powel (with GSS)	$\begin{bmatrix} 0.2291 \\ -0.0229 \\ 0.1097 \\ 0.1184 \end{bmatrix}$	0.0053	181	4887	181	0
Rosenbrock(with LS)	$\begin{bmatrix} 1.3508 \\ 1.8259 \end{bmatrix}$	0.1232	3	19	11	0
Powel (with LS)	$\begin{bmatrix} 0.2347 \\ -0.0230 \\ 0.1121 \\ 0.1214 \end{bmatrix}$	0.0058	184	258	244	0

TABLE 3. Simulation results for Newton.

Newton	x_{\min}	f_{\min}	iteration	Function evaluation	Gradient evaluation	Hessian evaluation
Rosenbrock(withGSS)	$\begin{bmatrix} 1.000 \\ 1.000 \end{bmatrix}$	$3.9212 \cdot 10^{-22}$	2	54	2	2
Powel (with GSS)	$1 \cdot 10^{-3} \begin{bmatrix} 0.0001 \\ 0.0001 \\ 0.6829 \\ 0.6829 \end{bmatrix}$	$7.8981 \cdot 10^{-12}$	12	324	12	12
Rosenbrock(with LS)	$\begin{bmatrix} 1 \\ 1 \end{bmatrix}$	0	2	2	2	2
Powel (with LS)	$\begin{bmatrix} -0.000 \\ 0.0000 \\ 0.0011 \\ 0.0011 \end{bmatrix}$	$3.8986 \cdot 10^{-11}$	18	19	19	18