آلگوریتمهای Line-Search

الف) کتاب فلچر 1st Ed، برمبنای شرایط ولف

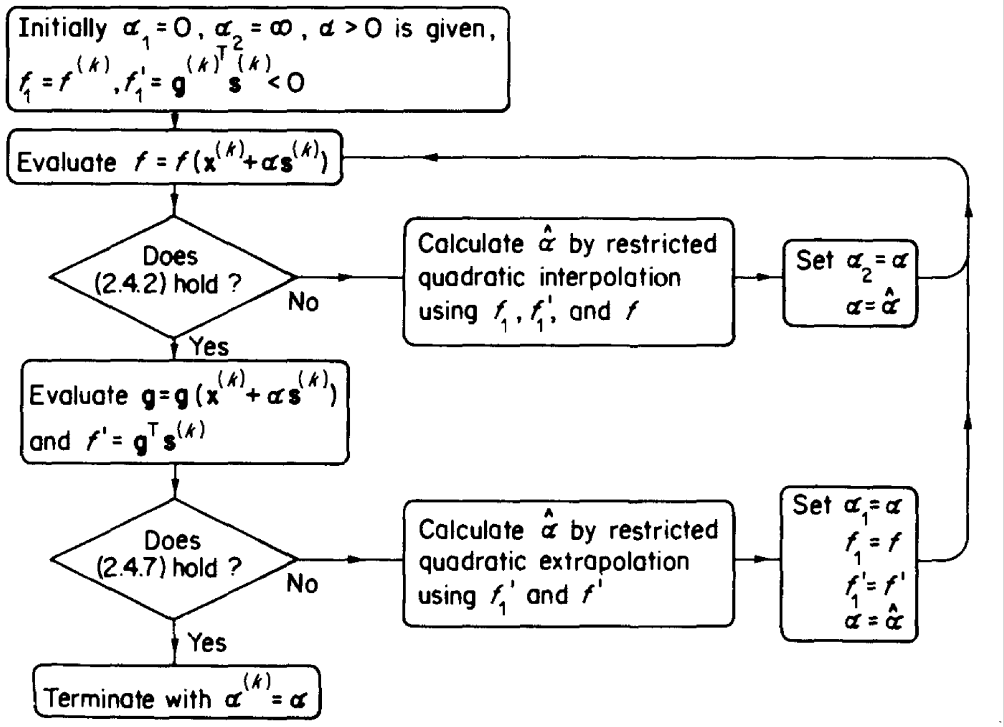

Figure 2.6.1 A line search structure

ب) کتاب فلچر 2nd Ed، بر مبنای شرایط قوی ولف

آلگوریتم Bracketing

for $i := 1, 2, \ldots$ do
begin evaluate $f(\alpha_i)$;
if $f(\alpha_i) \leqslant \bar{f}$ then terminate;
if $f(\alpha_i) > f(0) + \alpha_i f'(0)$ or $f(\alpha_i) \geqslant f(\alpha_{i-1})$
then begin $a_i := \alpha_{i-1}$; $b_i := \alpha_i$; terminate B end;
evaluate $f'(\alpha_i)$; (2.6.2)
if $|f'(\alpha_i)| \leqslant -\sigma f'(0)$ then terminate;
if $f'(\alpha_i) \geqslant 0$
then begin $a_i := \alpha_i$; $b_i := \alpha_{i-1}$; terminate B end;
if $\mu \leqslant 2\alpha_i - \alpha_{i-1}$
then $\alpha_{i+1} := \mu$
else choose $\alpha_{i+1} \in [2\alpha_i - \alpha_{i-1}, \min(\mu, \alpha_i + \tau_1(\alpha_i - \alpha_{i-1}))]$
end.

آلگوریتم Sectioning

for $j := i, i+1, \ldots$ do
begin choose $\alpha_j \in [a_j + \tau_2(b_j - a_j), b_j - \tau_3(b_j - a_j)]$;
evaluate $f(\alpha_j)$;
if $f(\alpha_j) > f(0) + \rho\alpha_j f'(0)$ or $f(\alpha_j) \geqslant f(a_j)$
then begin $a_{j+1} := a_j$; $b_{j+1} := \alpha_j$ end
else begin evaluate $f'(\alpha_j)$; (2.6.4)
if $|f'(\alpha_j)| \leqslant -\sigma f'(0)$ then terminate;
$a_{j+1} := \alpha_j$;
if $(b_j - a_j) f'(\alpha_j) \geqslant 0$ then $b_{j+1} := a_j$ else $b_{j+1} := b_j$
end.
end.

ج) از کتاب نوسدال

Algorithm 3.5 (Line Search Algorithm).

Set $\alpha_0 \leftarrow 0$, choose $\alpha_{\max} > 0$ and $\alpha_1 \in (0, \alpha_{\max})$;
$i \leftarrow 1$;
repeat
    Evaluate $\phi(\alpha_i)$;
    if $\phi(\alpha_i) > \phi(0) + c_1\alpha_i\phi'(0)$ or $[\phi(\alpha_i) \geq \phi(\alpha_{i-1})$ and $i > 1]$
        $\alpha_* \leftarrow$**zoom**(α_{i-1}, α_i) and **stop**;
    Evaluate $\phi'(\alpha_i)$;
    if $|\phi'(\alpha_i)| \leq -c_2\phi'(0)$
        set $\alpha_* \leftarrow \alpha_i$ and **stop**;
    if $\phi'(\alpha_i) \geq 0$
        set $\alpha_* \leftarrow$**zoom**(α_i, α_{i-1}) and **stop**;
    Choose $\alpha_{i+1} \in (\alpha_i, \alpha_{\max})$;
    $i \leftarrow i + 1$;
end (repeat)

Algorithm 3.6 (zoom).

repeat
    Interpolate (using quadratic, cubic, or bisection) to find
        a trial step length α_j between α_{lo} and α_{hi};
    Evaluate $\phi(\alpha_j)$;
    if $\phi(\alpha_j) > \phi(0) + c_1\alpha_j\phi'(0)$ or $\phi(\alpha_j) \geq \phi(\alpha_{\text{lo}})$
        $\alpha_{\text{hi}} \leftarrow \alpha_j$;
    else
        Evaluate $\phi'(\alpha_j)$;
        if $|\phi'(\alpha_j)| \leq -c_2\phi'(0)$
            Set $\alpha_* \leftarrow \alpha_j$ and **stop**;
        if $\phi'(\alpha_j)(\alpha_{\text{hi}} - \alpha_{\text{lo}}) \geq 0$
            $\alpha_{\text{hi}} \leftarrow \alpha_{\text{lo}}$;
        $\alpha_{\text{lo}} \leftarrow \alpha_j$;
end (repeat)