$\frac{1}{2}d, W_k d$
W_k
$\frac{1}{2t_k}\|d\|^2$
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?
$U \subset^n$
U
$\frac{1}{2t_k}\|d\|^2$
W_k
k
$\min_{\hat{x}^k+d\in^n} M_k(\hat{x}^k+$
$d)+$
$\mathtt{i}_X(\hat{x}^k+$
$d)+$
$\frac{1}{2}d, W_k d.$
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W_k
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W_k
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$$\Phi(x,\hat{x}) = \phi(x,\hat{x}) + \frac{1}{2}x - \hat{x}, Q(\hat{x})(x-\hat{x}) \quad (1)$$

$\phi(\cdot, \hat{x})$
$\frac{1}{2}\cdot$
$-\hat{x}, Q(\hat{x})(\cdot -$
$\hat{x})$
$\min_{\hat{x}^k+d} m_k(\hat{x}^k+$
$d)+$
$\frac{1}{2}d, Q(\hat{x}^k)d+$
$\frac{1}{2t_k}\|d\|^2$
m_k
??
ϕ
$Q(\hat{x}^k)$
?
$\hat{x}^k) :=$
$Q_k =$
$Q_k^\top and -$
$qIQ_kqIforaq >$
0
AB
$A, B \in^{n\times n}$
$(B-$
$A)$
$\succeq$
$(B-$
$A)$
Q_k
k

$$\min_{\hat{x}^k+d\in X} m_k(\hat{x}^k+d) + \frac{1}{2}d, \left(Q_k + \frac{1}{t_k}I\right)d. \quad (2)$$

$W_k =$
$Q_k +$
$\frac{1}{t_k}I$
$\phi(\cdot, \hat{x})$
??
M_k
??

$$\min_{\hat{x}^k+d\in X} M_k(\hat{x}^k+d) + \frac{1}{2}d, \left(Q_k + \frac{1}{t_k}I\right)d.$$

δ_k
??
δ_k
M_k
??
??

Algorithm ??.1: Non-convex Variable Metric Bundle Method with Inexact Information

$m \in (0,1), \gamma > 0, q > 0, 0 < t_{min} < \frac{1}{q}$
$\texttt{tol} \geq 0$
$x^1 \in^n$
f_1
g^1
$Q_1 = I$
$J_1 := \{1\}$
$\hat{x}^1 := x^1$
$\hat{f}_1 = f_1$
$s_1^1 = g^1$
$t_1 > 0$
$c_1^1 = 0$
$M_1(\hat{x}^1 + d) = \hat{f}_1 + s_1^1, d$
$k \equiv 1, \overline{2}, 3,$

$$d^k =_{d \in^n} \left\{ M_k(\hat{x}^k + d) + \texttt{i}_X(\hat{x}^k + d) + \frac{1}{2} d, \left(Q_k + \frac{1}{t_k} I \right) d \right\}.$$

$^k = \sum_{j \in J_k} \alpha_j^k s_j^k,$
$C_k = \sum_{j \in J_k} \alpha_j^k c_j^k and$
$\delta_k =$
$C_k +$