then an optimal set of
$$a_k$$
 can be found by minimizing
$$J_i(a_1, ..., a_n, e) = \sum_{k=1}^n ||(\vec{m} + a_k \vec{e}) - \vec{x_k}||^2$$

$$J_i(a_1, ..., a_n, e) = \sum_{k=1}^n ||a_k \vec{e} - (\vec{x_k} - \vec{m})||^2$$
(6)

$$J_i(a_1, ..., a_n, e) = \sum_{k=1} ||a_k \vec{e} - (\vec{x_k} - \vec{m})||^2$$

 $= \sum_{k=0}^{n} a_{k}^{2} ||\vec{e}||^{2} - 2 \sum_{k=0}^{n} a_{k} \vec{e}^{T} (\vec{x}_{k} - \vec{m}) + \sum_{k=0}^{n} ||\vec{x}_{k} - \vec{m}||^{2}$

$$J_i(a_1, ..., a_n, e) = \sum_{k=1}^{n} ||a_k e - (x_k - m)||^2$$