Effective mass fitting strategy

1) Start with N configurations of the correlator $C_i(t)$

2) Generate N_b bootstrap samples, $C_b(t) = \frac{1}{N}\sum_{i=1}^{N} C_{rand(i)}(t)$

3) Compute effective mass for each bootstrap sample: $E_b(t) = \frac{1}{t_J}\log\frac{C_b(t)}{C_b(t+t_J)}$
and the mean value $\bar{E}(t) = \frac{1}{N_b}\sum_{b=1}^{N_b} E_b(t)$

4) Compute covariance matrix $cov(t,t') = \frac{N}{N-1}\frac{1}{N_b}\sum_{b=1}^{N_b}\left[E_b(t)-\bar{E}(t)\right]\left[E_b(t')-\bar{E}(t')\right]$

5) Fit the effective mass data with some function $f(t) \nearrow c,\ \searrow c+ae^{-bt}$ by minimizing χ^2,

$$\chi^2 = \sum_{t,t'}\left[\bar{E}(t)-f(t)\right](cov^{-1})_{tt'}\left[\bar{E}(t')-f(t')\right]$$

→ extract central values for the parameters $\bar{c}$ or $\{\bar{a},\bar{b},\bar{c}\}$

6) To obtain the uncertainty on the fitted parameters, repeat the fit but replace $\bar{E}(t)\to E_b(t)$:

$$\chi^2 = \sum_{t,t'}\left[E_b(t)-f(t)\right](cov^{-1})_{tt'}\left[E_b(t')-f(t')\right]$$

and we will obtain N_b values for $\{c\}$ or $\{a,b,c\}$. Then, the 1-sigma error bars on the parameters will be obtained as $\sigma_c = \frac{q_{5/6}(\{c\}-\bar{c}) - q_{1/6}(\{c\}-\bar{c})}{2}$
where $q_{5/6}$ and $q_{1/6}$ are the $\frac{5}{6}$th and $\frac{1}{6}$th quantiles.

7) Repeat steps 4)-6) for different $\{t,t'\}$, and then choose your central value and statistical error from the result with best χ^2_{dof}, and the systematic error as the max difference between the central value and the results from different $\{t,t'\}$.