

**Data:**  $\mathbf{X}_1, \dots, \mathbf{X}_n$

**Result:** estimated model parameters by Manly forward model

**Initialization:** Gaussian mixture model

**while** *the current model  $\mathbf{M}_{current}$  has not reached the full Manly mixture model* **do**

1. find all zero skewness parameters in the current model  $\mathbf{M}_{current}$ ,  $\lambda_1, \dots, \lambda_t$ ;
2. construct new models  $\mathbf{M}_{new,1}, \dots, \mathbf{M}_{new,t}$  to compare with;
3.  $\mathbf{M}_{new,j}$  sets the previous nonzero  $K \times p - t$  skewness parameters and  $\lambda_j$  to be non-zero;
4. call function `Manly.EM()` to run the EM algorithm for each new model;
5. initialize with the parameters of model  $\mathbf{M}_{current}$  to speed the algorithm;

**if** *at least one new model has lower BIC than the original model  $\mathbf{M}_{current}$*  **then**

    find the smallest BIC among the new models;  
    the corresponding new model  $\mathbf{M}_{new}$  is selected and let  
         $\mathbf{M}_{current} \leftarrow \mathbf{M}_{new}$ .

**else**

    break;  
    the current model  $\mathbf{M}_{current}$  is the final solution reached by  
    Manly forward algorithm.

**end**

**end**