

$$am_{i_-, j_- \rightarrow k_-} := \mathbb{E} \left[ (\alpha_i + \alpha_j) \mathbf{a}_k, (e^{-\alpha_j} \xi_i + \xi_j) \mathbf{x}_k, 1 + O[\epsilon]^2 \right]$$

$$\begin{aligned} a\Delta_{i_- \rightarrow j_-, k_-} &:= \mathbb{E} \left[ \alpha_i (\mathbf{a}_j + \mathbf{a}_k), \xi_i (\mathbf{x}_j + \mathbf{x}_k), \right. \\ &\quad \left. 1 + \epsilon \xi_i \mathbf{x}_k (-\mathbf{a}_j + \xi_i \mathbf{x}_j / 2) + O[\epsilon]^2 \right] \end{aligned}$$

$$\begin{aligned} aS_{i_-} &:= \mathbb{E} \left[ -\alpha_i \mathbf{a}_i, -e^{\alpha_i} \xi_i \mathbf{x}_i, \right. \\ &\quad \left. 1 - \epsilon e^{\alpha_i} \xi_i \mathbf{x}_i (\mathbf{a}_i + e^{\alpha_i} \xi_i \mathbf{x}_i / 2) + O[\epsilon]^2 \right] \end{aligned}$$

$$\begin{aligned} aSi_{i_-} &:= \mathbb{E} \left[ -\alpha_i \mathbf{a}_i, -e^{\alpha_i} \xi_i \mathbf{x}_i, \right. \\ &\quad \left. 1 - \epsilon e^{\alpha_i} \xi_i \mathbf{x}_i (\mathbf{a}_i - 1 + e^{\alpha_i} \xi_i \mathbf{x}_i / 2) + O[\epsilon]^2 \right] \end{aligned}$$