

$$\begin{aligned}
 & \mathbb{E} \left[ a_j \alpha_i + a_k \alpha_i + b_j \beta_i + b_k \beta_i, y_j \eta_i + B_j y_k \eta_i + X_j \xi_i + X_k \xi_i, \right. \\
 & \left. 1 + \frac{1}{2} \left( B_j y_j y_k \eta_i^2 - 2 a_j X_k \xi_i + X_j X_k \xi_i^2 \right) \epsilon + \mathcal{O}[\epsilon]^2 \right]
 \end{aligned}$$