5)

$$h_i = h(\bar{r}_{ij}, \bar{r}_{ik}, \theta_{jik}) = \lambda \cdot \exp\left[\gamma(\bar{r}_{ij}-a)^{-1} + \gamma(\bar{r}_{ik}-a)^{-1}\right] \cdot \left(\cos\theta_{jik} + \frac{1}{3}\right)^2$$

$$\cos\theta_{jik} = \frac{\bar{r}_{ij}^2 + \bar{r}_{ik}^2 - \bar{r}_{jk}^2}{2 \times \bar{r}_{ij} \times \bar{r}_{ik}}$$

$$* \frac{\partial h_i}{\partial \bar{r}_{ij}} = \lambda \cdot \exp\left[\gamma(\bar{r}_{ij}-a)^{-1} + \gamma(\bar{r}_{ik}-a)^{-1}\right] \cdot (-\gamma)(\bar{r}_{ij}-a)^{-2} \cdot \left(\cos\theta_{jik} + \frac{1}{3}\right)^2$$

$$+ \lambda \exp\left[\gamma(\bar{r}_{ij}-a)^{-1} + \gamma(\bar{r}_{ik}-a)^{-1}\right] \cdot 2\left(\cos\theta_{jik} + \frac{1}{3}\right) \cdot \left(\frac{\bar{r}_{ij}^2 - \bar{r}_{ik}^2 + \bar{r}_{jk}^2}{2 \times \bar{r}_{ij}^2 \times \bar{r}_{ik}}\right)$$

$$= \lambda \cdot \exp\left[\gamma(\bar{r}_{ij}-a)^{-1} + \gamma(\bar{r}_{ik}-a)^{-1}\right] \cdot \left(\cos\theta_{jik} + \frac{1}{3}\right) \left[\left(\frac{\bar{r}_{ij}^2 - \bar{r}_{ik}^2 + \bar{r}_{jk}^2}{\bar{r}_{ij}^2 \times \bar{r}_{ik}}\right) - \gamma(\bar{r}_{ij}-a)^2 \left(\cos\theta + \frac{1}{3}\right)\right.$$

$$* \frac{\partial h_i}{\partial \bar{r}_{ik}} = \lambda \cdot \exp\left[\gamma(\bar{r}_{ij}-a)^{-1} + \gamma(\bar{r}_{ik}-a)^{-1}\right] \cdot (-\gamma)(\bar{r}_{ik}-a)^{-2} \cdot \left(\cos\theta_{jik} + \frac{1}{3}\right)^2$$

$$+ \lambda \cdot \exp\left[\gamma(\bar{r}_{ij}-a)^{-1} + \gamma(\bar{r}_{ik}-a)^{-1}\right] \cdot 2\left(\cos\theta_{jik} + \frac{1}{3}\right) \cdot \frac{(\bar{r}_{ik}^2 - \bar{r}_{ij}^2 + \bar{r}_{jk}^2)}{2 \times r_{ik}^2 \times r_{ij}}$$

$$= \lambda \cdot \exp\left[\gamma(\bar{r}_{ij}-a)^{-1} + \gamma(\bar{r}_{ik}-a)^{-1}\right] \cdot \left(\cos\theta_{jik} + \frac{1}{3}\right) \cdot \left[\left(\frac{\bar{r}_{ik}^2 - \bar{r}_{ij}^2 + \bar{r}_{jk}^2}{\bar{r}_{ik}^2 \times \bar{r}_{ij}}\right) - \gamma(\bar{r}_{ik}-a)^{-2}\left(\cos\theta_{jik} + \frac{1}{3}\right)\right]$$