?
α
α

$$\frac{d\vec{r_\alpha}}{dt} = \vec{V_\alpha}(t)$$
(1)
α

$$\frac{d\vec{V_\alpha}}{dt} = \vec{f_\alpha}(t) + \vec{\xi_\alpha}(t)$$
(2)
$\vec{\xi_\alpha}(t)$
α
$\vec{f_\alpha}(t)$
α

$$\vec{f_\alpha} = \vec{f_\alpha^0}\left(\vec{V_\alpha}\right) + \vec{f_{\alpha B}}\left(\vec{r_\alpha}\right) + \sum_{\beta\neq\alpha} \vec{f_{\alpha\beta}}\left(\vec{r_\alpha}, \vec{V_\alpha}, \vec{r_\beta}, \vec{V_\beta}\right) + \sum_i \vec{f_{\alpha i}}\left(\vec{r_\alpha}, \vec{r_i}, t\right)$$
(3)

$$\vec{f_\alpha^0}\left(\vec{V_\alpha}\right) = \frac{1}{\tau}\left(V_\alpha^0 \vec{e_\alpha} - \vec{V_\alpha}\right)$$
(4)
τ
$\vec{V_\alpha}$
V_α^0
V_α^0

$$V_\alpha^0 = \left[1 - \eta_\alpha(t)\right] V_\alpha^0(0) + \eta_\alpha(t)\, V_\alpha^{max}$$
(5)
$V_\alpha^0(0)$
V_α^{max}
α
α
V_α^{max}
η_α

$$\eta_\alpha(t) = 1 - \frac{\overline{V}_\alpha(t)}{V_\alpha^0(t)}$$
(6)
$\overline{V}$
$V_\alpha^0(0)$
α

$$\vec{f_{\alpha B}}\left(\vec{r_\alpha}\right) = -\nabla_{\vec{r_\alpha}} V_B\left(\|\vec{r_\alpha} - \vec{r_B^\alpha}\|\right)$$
(7)
$\nabla_{\vec{r_\alpha}}$
V_B
$\|\vec{r_\alpha} -$
$\vec{r_B^\alpha}\|$
α
α
α

$$V_B\left(\|\vec{r_\alpha} - \vec{r_B^\alpha}\|\right) = V_{\alpha B}^0 e^{-\|\vec{r_\alpha} - \vec{r_B^\alpha}\|/R}$$
(8)
$V_{\alpha B}^0$
R
α
β

$$\sum_{\beta(\neq\alpha)} \vec{f_{\alpha\beta}}(t) = A_\alpha^1 exp\left(\frac{r_{\alpha\beta} - d_{\alpha\beta}}{B_\alpha^1}\right)\vec{\eta_{\alpha\beta}}\cdot\left(\lambda_\alpha + (1-\lambda_\alpha)\frac{1+\cos\phi}{2}\right) + A_\alpha^2 exp\left(\frac{r_{\alpha\beta} - d_{\alpha\beta}}{B_\alpha^2}\right)\vec{\eta_{\alpha\beta}}$$
(9)
A_α^1
A_α^2
B_α^1
B_α^2
λ_α
$r_{\alpha\beta}$
α
β
$r_{\alpha\beta} =$
$r_\alpha +$
r_β
$d_{\alpha\beta}$
α
β
$d_{\alpha\beta} =$
$\|\vec{X_\alpha}(t) -$

λ_α
??
??

List of constants and variables

Symbol	Description	Unit
A_α^1		
A_α^2		
B_α^1		
B_α^2		
λ_α		
$\vec{f_\alpha}(t)$		α
$\vec{f_{\alpha B}}(\vec{r_\alpha})$		α
$\vec{f_{\alpha\beta}}\left(\vec{r_\alpha}, \vec{r_\beta}, \vec{V_\alpha}, \vec{V_\beta}\right)$		$\alpha\beta$
$\vec{f_{\alpha i}}(\vec{r_\alpha}, \vec{r_i}, t)$		α
V_α^0		α
V_α^{max}		α
$\vec{V_\alpha^0}$		α
$\overline{V}_\alpha$		
$\vec{e}_\alpha$		α
$\vec{r}_\alpha(t)$		α
$\vec{r}_B$		
r_α		α
r_β		β
$r_{\alpha\beta}$		$\alpha\beta$
$\vec{X}_\alpha$		α
$\vec{X}_\beta$		β
$d_{\alpha\beta}$		$\alpha\beta$
τ_α		$\alpha\beta$
$\vec{\eta}_\alpha$		α
$\vec{\eta}_{\alpha\beta}(t)$		$\alpha\beta$
$\vec{\xi}(t)$		
$\phi_{\alpha\beta}(t)$		$\alpha\beta$