

$$\frac{\partial S_f}{\partial t}=\frac{D_s}{L_f^2}\frac{\partial^2 S_f}{\partial x^2}+\frac{x\left(L_f\right)_t'}{L_f}\frac{\partial S_f}{\partial x}-q_{1s}\frac{O_{2f}}{K_{O_2}+O_{2f}}\frac{S_f}{K_S+S_f}X_{fl}-q_2\frac{S_f}{K_{S,an}+S_f}X_{f2}$$