

$$\dot{r}$$

$$\frac{dM_V}{dt} = J_{GV} = \frac{k_G}{(1 + (Y_{VE_c}(\kappa J_{E_cC} - \frac{(1+\sigma)}{Y_{SE_c}}))(-1) + (\kappa J_{E_nC})(-1) + (Y_{VE_c}(\kappa J_{E_cC} - \frac{(1+\sigma)}{Y_{SE_c}}))(-1)))}$$

$$J_{E_cC} = M_{E_c}(\nu(M_V/[M_V])^{-1/3}) - \dot{r})$$

$$J_{E_nC} = M_{E_n}(\nu(M_V/[M_V])^{-1/3}) - \dot{r})$$