The non-linear PDE is :

$$\left(1-\varphi+\frac{\varphi}{(1+u)\hat{}2}\right)\left(\frac{\partial u}{\partial \tau}+\frac{\varepsilon}{1-\tau}\frac{\partial u}{\partial \varepsilon}\right)-(\frac{1}{(1-\tau)^2}\frac{\partial}{\partial \varepsilon}\left((1-\varphi)\frac{\partial u}{\partial \varepsilon}\right))+\frac{(\gamma-u)}{(1-\tau)}\delta(\varepsilon-\varepsilon p)=0$$

Where,

$\varphi = k1 + k2 * H(\varepsilon - \varepsilon p);$ "$H(\varepsilon - \varepsilon p)$" *is the Heaviside step function.*

$\varepsilon p = \frac{(1-k3*\tau)}{(1-\tau)};$ "ε "*is dimensionless length*: "τ" *is dimensionless time*;

$\gamma = \frac{k4*u}{k5+u};$ $k1, k2, k3, k4, k5$ *are constants.*

$\delta(\varepsilon\text{-}\varepsilon p)$ *is the Dirac delta function.* " u "*is the dimensionless dependent variable.*

Boundary Conditions:

$\varepsilon = 0$ $\frac{\partial u}{\partial \varepsilon} = 0$

$\varepsilon = 1$ $(1-\varphi)\frac{\partial u}{\partial \varepsilon} = \left((1-\varphi)u + \gamma\varphi\right)(1-\tau)$

$\tau = 0$ $u = 1$