$$ODE\left(\tilde{u}, \lambda^*\right)$$

$$L_{ODE}$$

$$L_{Data}$$

$$Loss$$

$$Data$$

$$Optimiser$$

$$w^*, b^*$$

$$\lambda^*$$

$$DNN(w, b)$$

$$t$$

$$Loss_w = L_{\lambda^*} + \alpha_1 L_{Data} + \alpha_2 L_{ODE_1} + \ldots + \alpha_8 L_{ODE_7}$$

$$\alpha_k = \frac{e^{\beta S_k}}{\sum_{j=1}^{n} e^{\beta S_j}}$$

$$\alpha_k = \frac{l_k e^{\beta S_k}}{\sum_{j=1}^{n} l_j e^{\beta S_j}}$$

$$||S_k||_2 = 1$$

$$S_k$$

$$\beta = 0.1$$

$$L_{\lambda^*}$$

$$S_i$$

$$GEZI$$

$$EGP_0$$

S_k is rate of change over last 5 epochs in loss k We normalize S

$$SSRE = \sum_{i=1}^{n} \left(\frac{\lambda_i^{est} - \lambda_i^{true}}{\lambda_i^{true}} \right)^2$$

Parameters		**PINN**		**Bagterp et al.**	
Name	**True Value**	**Estimate**	**RE(%)**	**Estimates**	**RE(%)**
τ_1	49.0	51.992	6.11	69.0	40.8
τ_2	47.0	52.606	11.9	69.0	46.8
C_i	20.1	23.741	18.1	2.7	32.7
p_2	0.0106	0.000	100.0	1.4	36.1
S_i	0.0081	0.005	43.6	9.2	12.9
$GEZI$	0.0022	-0.000	100.9	11.2	435.5
EGP_0	1.33	0.0001	100.0	2.1	55.3
V_g	253.0	301.207	19.1	239.9	5.2
τ_m	47.0	61.865	31.6	44.6	5.4

Table 0.1: Comparison of parameter true values, PINN final guesses, relative errors, and predictions by Bagterp et al.

Parameters		**PINN**		**Bagterp et al.**
Parameter	**True Value**	**Estimate**	**RE(%)**	**RE(%)**
τ_1	49.0000	48.2967	1.44	40.8
τ_2	47.0000	50.5698	7.60	46.8
C_i	20.1000	19.8929	1.03	32.7
p_2	0.0106	0.0032	69.8	36.1
$GEZI$	0.0022	-0.0000	101.97	435.5
S_i	0.0081	0.0009	88.9	12.9
EGP_0	1.3300	0.0000	100.0	55.3
V_g	253.0000	280.4632	10.86	5.2
τ_m	47.0000	54.2197	15.36	5.4
τ_{sc}	5.0000	4.4335	11.33	N/A

Table 0.2: Comparison of parameter true values, PINN final guesses, relative errors, and Bagterp et al.'s relative errors.

Parameters		**PINN**		**Bagterp et al.**	
Parameter	**True Value**	**Estimate**	**RE(%)**	**Estimate**	**RE(%)**
τ_1	49.0000	48.2967	1.44	69.0	40.8
τ_2	47.0000	50.5698	7.60	69.0	46.8
C_i	20.1000	19.8929	1.03	2.7	32.7
p_2	0.0106	0.0032	69.8	1.4	36.1
S_i	0.0081	0.0009	88.9	9.2	12.9
$GEZI$	0.0022	-0.0000	101.97	11.2	435.5
EGP_0	1.3300	0.0000	100.0	2.1	55.3
V_g	253.0000	280.4632	10.86	239.9	5.2
τ_m	47.0000	54.2197	15.36	44.6	5.4
τ_{sc}	5.0000	4.4335	11.33	N/A	N/A

Table 0.3: Comparison of parameter true values, PINN final guesses, relative errors, and predictions by Bagterp et al.