

Parameter	Description	Value S1	Value S2	Units	Bounds
$\tau_{E, rise}$	Rise time of E conductance	1.3	1	ms	1 - 600
$\tau_{E, decay}$	Decay time of E conductance	6.2	87	ms	1 - 600
A_E	Conductance amplitude (E)	2.31e-6	2.62e-5	μS	0 - 1
μ_E	Center location along dendrite (E)	0.589	0.595	unitless	-0.1 – 1.3
σ_E	Width of conductance spatial profile (E)	0.156	0.153	unitless	0 - 1
$\tau_{I, rise}$	Rise time of I conductance	1	152	ms	1 - 600
$\tau_{I, decay}$	Decay time of I conductance	307	154	ms	1 - 600
A_I	Conductance amplitude (I)	3.77e-5	4.82e-4	μS	0 – 0.1
μ_I	Center location along dendrite (I)	0.779	0.77	unitless	-0.1 – 1.3
σ_I	Width of conductance spatial profile (I)	0.103	0.1	unitless	0 - 1
R_M	Membrane resistivity	10e4	10e3	Ωcm^2	100 – 100K
R_A	Axial resistivity	100	100	Ωcm	100-5K
C_M	Membrane capacitance	1		$\mu F/cm^2$	Fixed
V_E	Reversal potential (E)	0		mV	Fixed
V_I	Reversal potential (I)	-70		mV	Fixed
V_L	Resting potential	-65		mV	Fixed

Supplementary Table 1: Model parameters

Parameter fit by optimization to SPFRs, then used in the conductance model to simulate apparent motion. The minimization procedure was run 1000 times, with randomized initial conditions (uniformly sampled within the bounds). 2 solution clusters showed modeled SPFRs that were similar to the measured responses (Supplementary Fig. 6c). The parameters from example solutions from these clusters that are used in the manuscript (Fig. 5 and Supplementary Fig. 6) are shown in the table above.