All transmembrane potentials are expressed in , intrinsic and synaptic conductances in , currents in , and time constants in . For all cell models the membrane capacitance is .

**Thalamic Neuron Model**

**Table 2**

TH neuron model equations

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Current | Equation | Gating variables | | | | Parameters |
|  |  |  | | | |  |
|  |  |  |  | | |  |
|  |  |  |
|  |  | Same h as in | | | |  |
|  |  |  | |  | |  |
|  | |
|  |  |  | | | |  |
|  | 1.2 |  | | | |  |

**External Globus Pallidus Neuron Model**

**Table 3**

GPe neuron model equations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Current | Equation | Gating variables | | | Parameters |
|  |  |  | | |  |
|  |  |  |  | |  |
|  | |
|  |  |  | | |  |
|  | | |
|  |  |  | |  |  |
|  |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |
|  | 3 |  | | |  |

**Internal Globus Pallidus Neuron Model**

**Table 4**

GPi neuron model equations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Current | Equation | Gating variables | | | Parameters |
|  |  |  | | |  |
|  |  |  |  | |  |
|  | |
|  |  |  | | |  |
|  | | |
|  |  |  | |  |  |
|  |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |
|  | 3 |  | | |  |

**Subthalamic Nucleus Neuron Model**

**Table 5**

STN neuron model equations

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Current | Equation | Gating variables | | | | | Parameters |
|  |  |  | | | | |  |
|  |  |  |  | | | |  |
|  |  | | | |
|  |  |  | | | | |  |
|  | | | | |
|  |  |  | | |  | |  |
|  | | |  | |
|  |  |  | | | | |  |
|  | | | | |
|  |  |  | |  | | |  |
|  | |  | | |
|  |  |  |  | | |  |  |
|  |  | | |  |
|  |  |  | | | | |  |
|  |  |  | | | | |  |
|  |  |  | | | | |  |

**Striatum Medium Spiny Neuron Model**

**Table 6**

MSN neuron model equations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Current | Equation | Gating variables | | Parameters |
|  |  |  | |  |
|  |  |  |  |  |
|  |  |
|  |  |  | |  |
|  | |
|  |  |  | |  |
|  | |
|  |  |  | |  |
|  |  |  | |  |

**Cortical Regular Spiking Projection Neuron Model**

**Table 7**

CTX regular spiking neuron model parameters

|  |  |
| --- | --- |
| Parameter | Value |
|  |  |
|  |  |
|  |  |
|  |  |

**Table 8**

CTX Regular Spiking neuron model equations

|  |  |  |  |
| --- | --- | --- | --- |
| Current | Equation | Gating variables | Parameters |
|  |  |  |  |
|  |  |  |  |

**Cortical Fast Spiking Interneuron Model**

**Table 9**

CTX fast spiking interneuron model parameters

|  |  |
| --- | --- |
| Parameter | Value |
|  |  |
|  |  |
|  |  |
|  |  |

**Table 10**

CTX fast spiking interneuron model equations

|  |  |  |  |
| --- | --- | --- | --- |
| Current | Equation | Gating variables | Parameters |
|  |  |  |  |

**Table 11**

Healthy and PD state parameters

|  |  |  |  |
| --- | --- | --- | --- |
| *Conditions* |  |  |  |
| *Healthy* |  |  |  |
| *PD* |  |  |  |