

## APPENDIX A

### Equations

The ionic current equations of the CRRSS model can be written as

1.  $I_{ion} = I_{Na} + I_L$
2.  $I_{Na} = g_{Na} m^2 h (V_m - E_{Na})$   
 $V = V_m - E_r$   
 $\frac{dm}{dt} = \alpha_m (1 - m) - \beta_m m$   
 $\alpha_m = \frac{97 + 0.363V}{(1 + \exp(\frac{31 - V}{5.3}))}$   
 $\beta_m = \frac{\alpha_m}{\exp(\frac{V - 23.8}{4.17})}$   
 $\frac{dh}{dt} = \alpha_h (1 - h) - \beta_h h$   
 $\alpha_h = \frac{\beta_h}{\exp(\frac{V - 5.5}{5})}$   
 $\beta_h = \frac{15.6}{\exp(\frac{24 - V}{10})}$
3.  $I_L = g_L (V_m - E_L)$

### Variables

|          |                             |
|----------|-----------------------------|
| $I_{Na}$ | sodium current density      |
| $I_L$    | leakage current density     |
| $m$      | sodium channel activation   |
| $h$      | sodium channel inactivation |

### Constants

|          |        |                                                                    |
|----------|--------|--------------------------------------------------------------------|
| $E_r$    | -80    | resting membrane potential(mV)                                     |
| $g_{Na}$ | 1445   | maximum sodium channel conductance/unit area(mS/cm <sup>2</sup> )  |
| $E_{Na}$ | 35.64  | Nernst potential for sodium channels(mV)                           |
| $g_L$    | 128    | maximum leakage channel conductance/unit area(mS/cm <sup>2</sup> ) |
| $E_L$    | -80.01 | Nernst potential for leakage channels(mV)                          |
| $l_n$    | 1.5    | nodal gap length(μm)                                               |