

Erratum to “A Mean-Field Description of Bursting Dynamics in Spiking Neural Networks with Short-Term Adaptation” by Richard Gast, Helmut Schmidt, and Thomas R. Knösche (*Neural Computation*, September 2020, Vol. 32, No. 9, pp. 1615–1634)

7 Erratum

7.1 Regarding the Mathematical Definition of SD. To implement synaptic depression in our model, we introduced an adaptation variable A to our model, governed by equations 3.2 to 3.4. These equations represent synaptic depression as a convolution with an alpha kernel with rate α and timescale τ_A . We solved the convolution integral to express it as a set of differential equations (see equations 3.5 and 3.6). However, equation 3.6 contains an erroneous scaling of the input firing rate r with the capitation time constant τ_A . The convolution integral in equation 3.2 can be expressed as a second-order differential equation:

$$\tau_A \ddot{A} = -2\dot{A} - \frac{A}{\tau_A} + \alpha r. \quad (7.1)$$

The equation can be transformed into a set of two coupled first-order differential equations under a simple change of variables:

$$\tau_A \dot{A} = B, \quad (7.2)$$

$$\tau_A \dot{B} = -2B - A + \alpha \tau_A r. \quad (7.3)$$

Equation 7.3 differs from equation 3.6 merely by a constant scaling of r with τ_A . Since we have never varied τ_A in this study, this has no impact on our results. Still, the reported values of α for which we find synchronized bursting hold only for synaptic depression given by equations 7.2 and 7.3.