A mathematical modeling toolbox for ion channels and transporters across cell membranes

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The following supplementary material is from " A mathematical modeling toolbox for ion channels and transporters across cell membranes" manuscript. It contains an overview of all equations related to Ion channels, Pumps, Cotransporters, and Symporters, organized in a table form. The detailed transporters along with the descriptions of their equatuons can be found from here.

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1.3.3. *Store Operated Channels (SOC)*

Store Operated Channels (SOC)	Ref
$$\boxed{I^{M-N}_{Ca,SOC} = g^{max}_{Ca,SOC} f^{SOC}_o \left(V^{M-N}_m - V^{M-N}_{Ca,rev}\right)} \quad (71)$$	[2, 23]
$$\boxed{I^{M-N}_{Na,SOC} = I^{M-N}_{Ca,SOC}\left(\frac{z^2_{Na}P^{SOC}_{Na}}{z^2_{Ca}P^{SOC}_{Ca}}\right)\times\left(\frac{[Na]_i - [Na]_o exp\left(\frac{-z_{Na}FV^{M-N}_m}{RT}\right)}{[Ca]_i - [Ca]_o exp\left(\frac{-z_{Ca}FV^{M-N}_m}{RT}\right)}\right)\left(\frac{1-exp\left(\frac{-z_{Ca}FV^{M-N}_m}{RT}\right)}{1-exp\left(\frac{-z_{Na}FV^{M-N}_m}{RT}\right)}\right)} \quad (72)$$	
where $$f^{SOC}_o = \frac{1}{1+\frac{[Ca]^{\eta_{SOC}}_{sr}}{K^{\eta_{SOC}}_{SOC}}} \quad (73)$$	
$$\boxed{I^{M,N}_{Ca,SOC} = A^{M-N}_m P_{Ca,SOC}\,\frac{z^2_{Ca}\,F^2V^{M-N}_m}{RT}\,\frac{[Ca]_i - [Ca]_o exp\frac{-z_{Ca}FV^{M-N}_m}{RT}}{1-exp\frac{-z_{Ca}FV^{M-N}_m}{RT}}} \quad (74)$$	[3]
$$\boxed{I^{M,N}_{Na,SOC} = A^{M-N}_m P_{Na,SOC}\,\frac{z^2_{Na}\,F^2V^{M-N}_m}{RT}\,\frac{[Na]_i - [Na]_o exp\frac{-z_{Na}FV^{M-N}_m}{RT}}{1-exp\frac{-z_{Na}FV^{M-N}_m}{RT}}} \quad (75)$$	
$$\boxed{I^{M,N}_{SOC,total} = f^{SOC}_o\left(I^{M,N}_{Ca,SOC} + I^{M,N}_{Na,SOC}\right)} \quad (76)$$	
(77)	
where $$P^{M-N}_{Na,SOC} = \frac{P^{max}_{SOC}}{1+\left(\frac{[Ca]_o}{K_{SOC,Ca_o}}\right)^{\eta_{SOC,Na}}} \quad (78)$$	
$$f^{SOC}_o = a\left(\frac{1}{1+\left(\frac{[Ca]_{sr}}{K_{SOC}}\right)^{\eta_{SOC}}}\right) + b \quad (79)$$	
$$V^{M-N}_{Ca,rev} = \frac{RT}{z_{Ca}F} ln\left(\frac{[Ca]_o}{[Ca]_i}\right) \quad (80)$$	

Table 6: The corresponding equations describing the flux and current transported via store operated calcium channels (SOCs) across the cell membrane.