

Evans, J. D.; Kember, G. C.

Analytical solutions to a tapering multicylinder somatic shunt cable model for passive neurones. (English) [Zbl 0943.92011](#)

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Summary: A multicylinder somatic shunt cable model for passive neurons is considered in which one or more tapering equivalent cylinders emanate from a uniformly polarized soma. Each tapering equivalent cylinder approximates the loss of dendritic trunk parameter in the one or more dendritic trees that it represents, relaxing certain symmetry conditions necessary for the Rall equivalent cylinder concept and in particular allowing terminal branches to end at different electrotonic lengths. The case of exponential taper is considered in detail following the anatomical data on apical and basilar dendrites of CA1 and CA3 hippocampal pyramidal neurons obtained by *D. A. Turner* and *P. A. Schwartzkroin* [*J. Neurophysiol.* 44, 184 (1980); *J. Neurosci.* 3, 2381 (1983)].

MSC:

[92C20](#) Neural biology

[35Q92](#) PDEs in connection with biology, chemistry and other natural sciences

[78A70](#) Biological applications of optics and electromagnetic theory

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[Green's function](#); [nerve cells](#); [Rall cable model](#); [unit impulse solution](#)

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