LETTER TO THE EDITOR

Comments on "Numerical Solution of the Steady-State Electrodiffusion Equations for a Simple Membrane"

Dear Sir:

The above-named paper (Arndt et al., 1971) provides an interesting extension of Fourier's classical method of solving the diffusion problem. Unfortunately, their boundary assumption of electroneutrality (equations 6) is not in accord with reality, as shown, for example, by Mauro (1961); this departure may be of primary importance in explaining the excitability cycle (Offner, 1970).

Other methods of solution of the Poisson–Nernst-Planck equation are available, for which no such limiting assumptions are necessary. The ballistic method (Offner, 1970) is somewhat limited in its application, often not converging over longer integration intervals. The difference equation method (Offner, 1971) has been used successfully for a wide variety of problems, with good convergence. Both methods are applicable to regimes with variable mobility and fixed charge density, and with any defined double layer structure.

The difference equation method is also applicable to the solution of the time-variant problem; this will be published in the near future.

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REFERENCES

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