Investigation of the Diffusion Impedance for an Irreversible Redox Reaction

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Simple reactant diffusion can be analysed reliably over a finite diffusion layer. The diffusional impedance may be affected by issues arising from homogeneous reactions, variable properties, or ionic migration, and hence more detailed research is needed. The proposed finite-layer impedance model is based on a nonlinear system of equations that includes a nonlinear term related to the diffusion layer's homogeneous reaction. An analytical method is applied to solve the non-steady-state nonlinear equations. The approximate closed-form of analytical expression corresponding to the diffusion-layer impedance has been derived.

Keywords: Impedance, Reaction-diffusion, Nonlinear equations, irreversible homogeneous reaction.

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