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AN ELECTRONEUTRAL COMPUTATIONAL HOMOGENIZATION FORMULATION FOR LI-ION BATTERY CELLS.

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In a recent contribution [1] the Computational Homogenization technique [2] was tailored to model the multi-physics processes that take place in Li-ion batteries [3]. An evolution of such a contribution is presented here. Novelties are relevant to: i) electroneutrality - that has been assumed (yet not imposed as for the balance equations); ii) Maxwells equations - that have been considered in a quasi-static sense in a rigorous way, whereas steady motion of charges has been taken for the mere estimation of the magnetizing field along the electrolyte/active particle interface; iii) time dependent scale transitions - that are formulated as required by the length/time scales involved in Li-ion batteries processes; iv) scale separation in time - that has been argued and finally neglected in the light of the fast ionic mobility in the electrolyte. The numerical implementation of this multiscale approach, accompanied by suited constitutive assumptions, is shown in a companion presentation.

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