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Stresses due to Relative Sliding between Particles Surrounded by an Electrolyte Solution with Application to Lithium-Ion Batteries[1] CONG ZHANG, A.T. CONLISK, The Ohio State University — Mechanical stresses in the solid phase of the electrodes within lithium-ion batteries have been the subject of much work recently with the emphasis on the stresses induced by lithium insertion to or extraction from the active solid material. The particles within lithium-ion battery electrodes can undergo relative motion with relative velocities of different magnitudes and directions. One mode of the relative motion, resembling the slider bearing motion, manifests itself as two particles sliding relative to each other within an electrolyte solution. The electrolyte solution within the narrow pores between the particles is the medium through which the particles interact with each other. The effect of the electrolyte solution is not conventionally considered. The relative motion of the particles induces significant pressures. The primary objective of this work is to develop a model based on the lubrication approximation to investigate the magnitude and direction of the stresses induced by this sliding motion. Other applications in the biomedical field are also discussed.

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