1145-35-1221 **Zilong Song*** (buctsongzilong@163.com), **Xiulei Cao** and **Huaxiong Huang**. *Electro-neutral models for a dynamic Poisson-Nernst-Planck System.*

The Poisson-Nernst-Planck (PNP) system is a standard model for describing ion transport. In many applications, e.g., ions in biological tissues, the presence of thin boundary layers poses both modelling and computational challenges. In this talk, we derive simplified electro-neutral (EN) models in multi-dimensional space where the thin boundary layers are replaced by effective boundary conditions. First of all, it is much cheaper to solve the EN models numerically. Secondly, EN models are easier to deal with compared with the original PNP system, therefore it is also easier to derive macroscopic models for cellular structures using EN models. The multi-ion case with general boundary is considered, for a variety of boundary conditions including either Dirichlet or flux boundary conditions. Using systematic asymptotic analysis, we derive a variety of effective boundary conditions directly applicable to the EN system for the bulk region. To validate the EN models, numerical computations are carried out for both the EN and original PNP system, including the propagation of action potential for both myelinated and unmyelinated axons. Our results show that solving the EN models is much more efficient than the original PNP system. (Received September 20, 2018)