

國立中央大學數學系

專題演講

主 講 人：呂治鴻博士 (NCTS博士後研究員)

演講題目：**Boundary layer solutions to Poisson--Boltzmann
type equations**

演講茶會：2025年10月02日(星期四) 3:30 p.m. ~ 4:00 p.m.

茶會地點：中央大學鴻經館M306

演講時間：2025年10月02日(星期四) 4:00 p.m. ~ 5:00 p.m.

演講地點：中央大學鴻經館M107

Abstract：

The Poisson--Boltzmann (PB) equation is a fundamental model for describing ionic distributions. When a charged surface (e.g., an electrode, membrane, or colloid) is in contact with an electrolyte, a structured layer of charge known as the electric double layer (EDL) forms. To understand the structure of the EDL, we study the boundary layer solutions to the singular perturbed problems for PB type equations with a small parameter ϵ in bounded smooth multiply connected domains under the Robin boundary conditions. The PB type equations include the classical PB, modified PB and charge-conserving PB (CCPB) equations. The CCPB equations present particular analytical challenges due to their nonlocal nonlinearity introduced through integral terms enforcing charge conservation. Using the principal coordinate system, exponential-type estimates and the method of moving planes, we rigorously prove asymptotic expansions of boundary layer solutions throughout the whole domain and show the effect of boundary mean curvature.

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