Stability of solutions for the Maxwell-Chern-Simons model

Abstract

This presentation considers an elliptic system derived from the study of the Maxwell-Chern-Simons model, which involves two distinct parameters: the Chern-Simons mass scale and the inverse Chern-Simons parameter. We first establish the equivalence between stable solutions and topological solutions with respect to the two distinct parameters in the Chern-Simon type regime. To deal with the stability of our elliptic system, we study a reduced functional including the Laplacian, and biharmonic terms appear in the corresponding linearized operator of the second Frechet derivative. Therefore, a careful analysis is required to handle the biharmonic terms as well as the disparate scales of the two parameters. Furthermore, we show the uniqueness of stable solutions in the Chern-Simon type regime. (This was supported by Korea National University of Transportation in 2025.)