

Singular limit of diffusion equations in 3D domains with thickness converging to zero

Adam Bobrowski

This is a joint work with Tomasz Lipniacki. We consider a singular limit of diffusion equations in 3D domains of thickness converging to zero. In the 2D limit the resulting reaction-diffusion equation has a source term resulting from the Robin-type boundary conditions imposed on boundaries of original 3D domain. The proposed approach can be applied to constructing approximate solutions of diffusion problems in thin planar, cylindrical, or spherical layers between two membranes. As an example we refer to the problem of activation of B lymphocytes, which typically have large nuclei and a thin cytoplasmic layer which can be considered as a spherical shell. For this example, assuming additionally axial symmetry we provide a rigorous convergence theorem in the language of semigroups of operators.

A. Bobrowski, NADBYSTRZYCKA 38D, 20-618 LUBLIN
Adres e-mail: a.bobrowski@pollub.pl