

Lord Kelvin's method of images in semigroups and cosine functions theory

Abstract

We consider two independent problems – asymptotics of the Rotenberg model of cell populations development and existence of a cosine functions preserving given functionals. The connection between these subjects is Lord Kelvin's method of images, which is a natural and intuitive approach to boundary problems.

In the first part of the thesis we prove that there exists a strongly continuous semigroup related to the Rotenberg model. We also find growth estimates for the semigroup and discuss their optimality. Finally we focus on the asymptotic behaviour of the semigroup, finding in particular sufficient conditions for its asymptotic stability.

In the second part we consider cosine functions preserving given functionals and generated by restrictions of the Laplace operator. We solve the problem of existence and uniqueness of such cosine functions when the functionals are moment and in the case of type zero or one functionals – two class which we introduce.

Keywords

Method of images, semigroups of operators, cosine functions, Rotenberg model

AMS subject classifications

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